PERIODICAL
October, 1946

Vol. 35, No. 8

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

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SHOP PROJECTS NUMBER

Teach your students how

COLOR DYNAMICS*

improves production techniques!

*COLOR DYNAMICS

. . . scientific use of the *energy in color* reduces eye fatigue and absenteeism—builds up morale and efficiency—improves quantity and quality of production!

● *Suggested color plan for vocational classroom, decorated according to the principles of COLOR DYNAMICS*

THE KNOWLEDGE of the skilled shopman of tomorrow will not merely be confined to metals, machines and methods. He will also know how to use color effectively in plant maintenance in order to turn out better production.

That's why many industrial and vocational schools include Pittsburgh's science of COLOR DYNAMICS in their training courses. This is a complete and comprehensive system which uses the *energy in color* to improve quantity and quality of output.

In this system, colors are classified according to their influence on normal human beings. *Focal* colors lessen eye fatigue and nervous tension. *Eye-rest* colors relax the eyes of the worker. *Morale-building* colors promote cheerfulness and restrain mental depression. *Safety* colors reduce accidents by warning of impending danger.

COLOR DYNAMICS has been applied successfully in hundreds of leading plants. It is now recognized as a distinct advance in production technique.

Begin now to teach your students COLOR DYNAMICS. For a practical demonstration of its benefits paint the walls, floors, ceilings and machines of your manual training rooms. You'll be pleased with the results!

Write today for a free copy of our book, *"Color Dynamics,"* which explains how to use this new system. Packed with interesting data, it is an excellent text book. Pittsburgh Plate Glass Company, Dept. IV-10, Pittsburgh 22, Pennsylvania.

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PITTSBURGH PLATE GLASS COMPANY, PITTSBURGH, PA.

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

SOUTH BEND *Precision* LATHES

ENGINE LATHES • TOOLROOM LATHES • TURRET LATHES • ATTACHMENTS

No. 1001-Z SOUTH BEND TURRET LATHE

16" x 6' SOUTH BEND TOOLROOM LATHE

10" x 3½' SOUTH BEND TOOLROOM LATHE

13" x 5' SOUTH BEND TOOLROOM LATHE

9" x 3' SOUTH BEND MODEL A BENCH LATHE

14½" x 5' SOUTH BEND ENGINE LATHE

TEACHING HELPS FOR SHOP CLASSES

Manuals, sound films, wall charts, booklets, and other teaching and study helps on the operation and care of metal working lathes are available to shop instructors, supervisors, and trainees. Write today for free Bulletin No. 21 which illustrates and describes this valuable educational material!

The outstanding records for performance and dependability which South Bend Precision Lathes have achieved under the critical demands of American industry recommend them for student training purposes in the school shop. Performance and dependability, plus ease of control, simplicity of operation, unfailing precision, unusual versatility, and built-in safety features, make South Bend Precision Lathes the logical installations for those school shops where the quality and thoroughness of training are principal considerations. Certainly it is to the students' advantage to learn in school to operate the lathes which they are most likely to use in industry.

WRITE FOR CATALOG 100-D

Illustrates in full color, and gives complete, detailed specifications of all types, sizes, and models of South Bend Precision Lathes; shows all South Bend lathe attachments and accessories. Mailed free on request.

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Collets and Collet Sets

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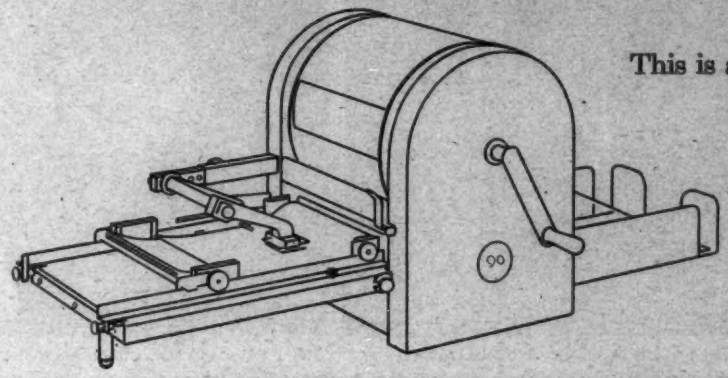
Double Tool Cross Slide

Primer of Mimeograph duplication



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This is a teacher.

What does the Mimeograph duplicator do for the teacher?

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It gives every child his own copy of lesson plans and text material when books are scarce or not available at all.

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It helps win community support for schools through low-cost school newspapers and yearbooks.

It helps teachers take advantage of the increased emphasis on visual teaching methods.

And it does it all so quickly and easily that the teacher has more freedom to develop her own good ideas and more time for "after school" things, too.

Almost every school has a Mimeograph duplicator.

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A complete line is now available.

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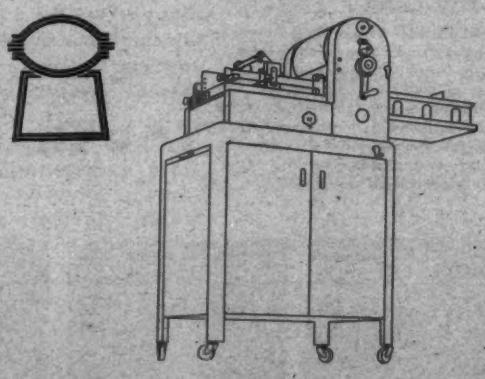

Mimeograph duplicator

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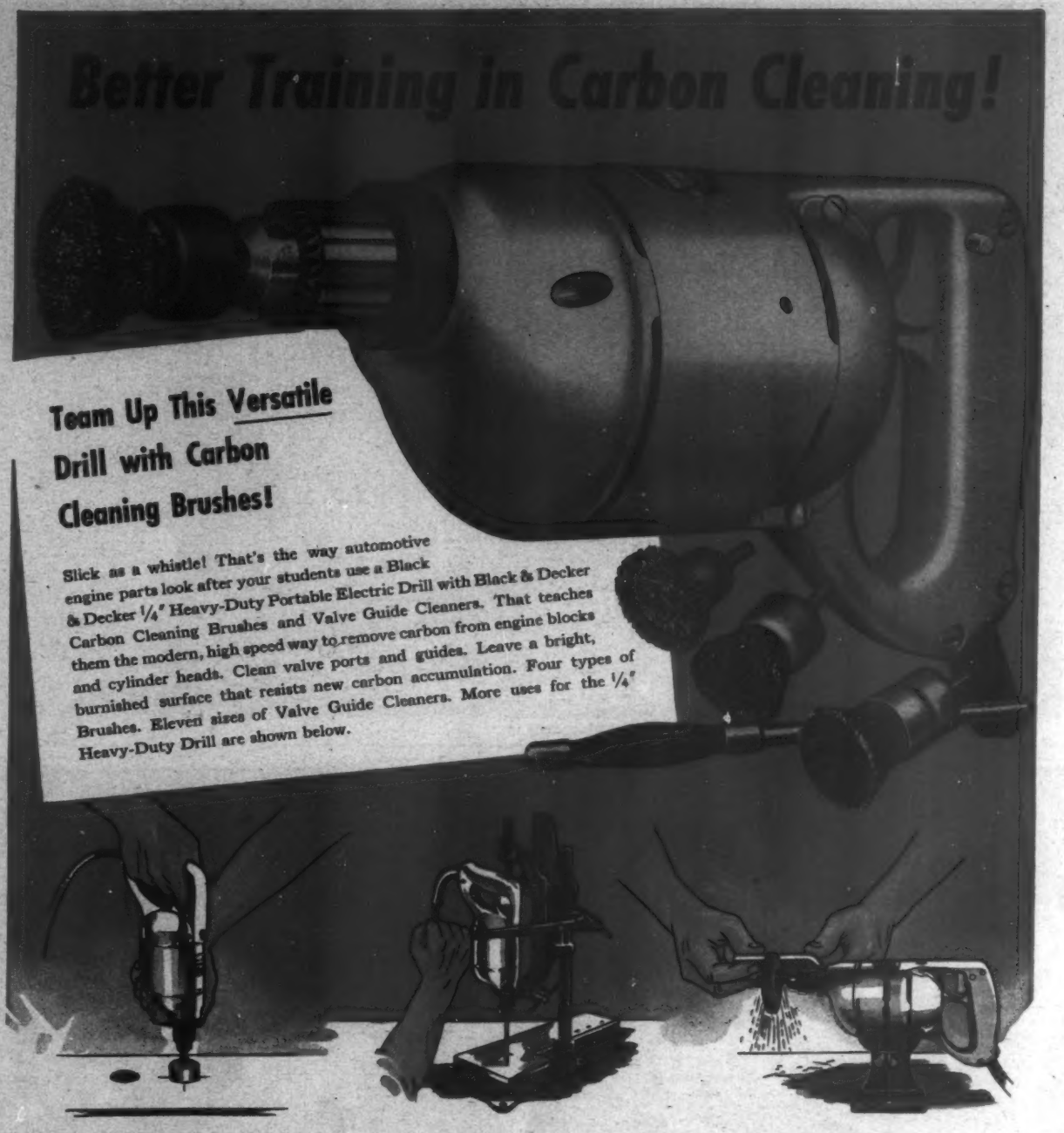
Better Training in Carbon Cleaning!



Team Up This Versatile Drill with Carbon Cleaning Brushes!

Slick as a whistle! That's the way automotive engine parts look after your students use a Black & Decker 1/4" Heavy-Duty Portable Electric Drill with Black & Decker Carbon Cleaning Brushes and Valve Guide Cleaners. That teaches them the modern, high speed way to remove carbon from engine blocks and cylinder heads. Clean valve ports and guides. Leave a bright, burnished surface that resists new carbon accumulation. Four types of Brushes. Eleven sizes of Valve Guide Cleaners. More uses for the 1/4" Heavy-Duty Drill are shown below.

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The 1/4" Heavy-Duty Drill drives twist drills up to 1/4", wood augers up to 1/2", Hole Saws for cutting clean, round holes up to 1 1/2" diameter in any material a hacksaw will cut.

As a Drill Press . . .

Mounted in a Black & Decker Bench Drill Stand, this Drill makes a powerful drill press. Plenty of leverage to put on the pressure. A slow, smooth feed for more precise work.

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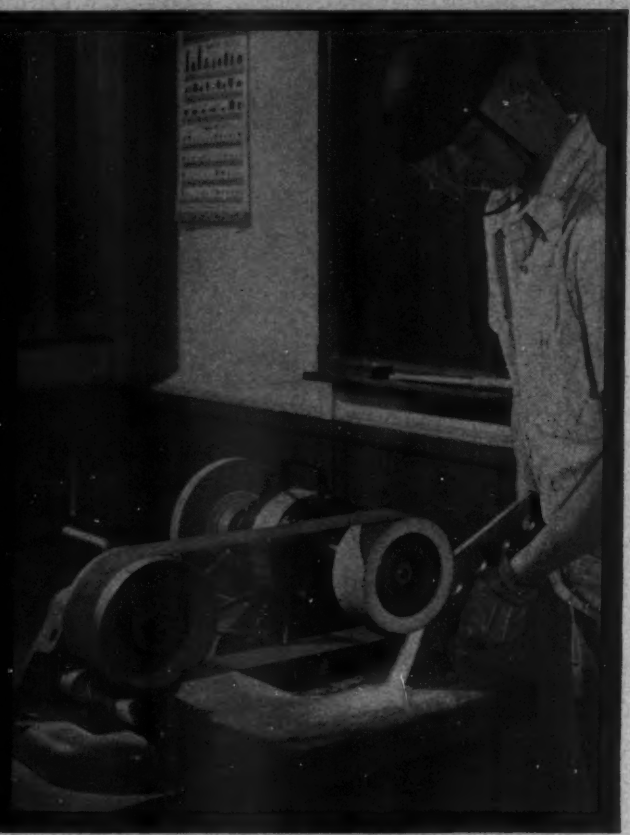
* ½ h.p. or larger.



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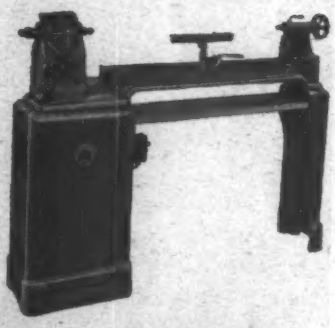

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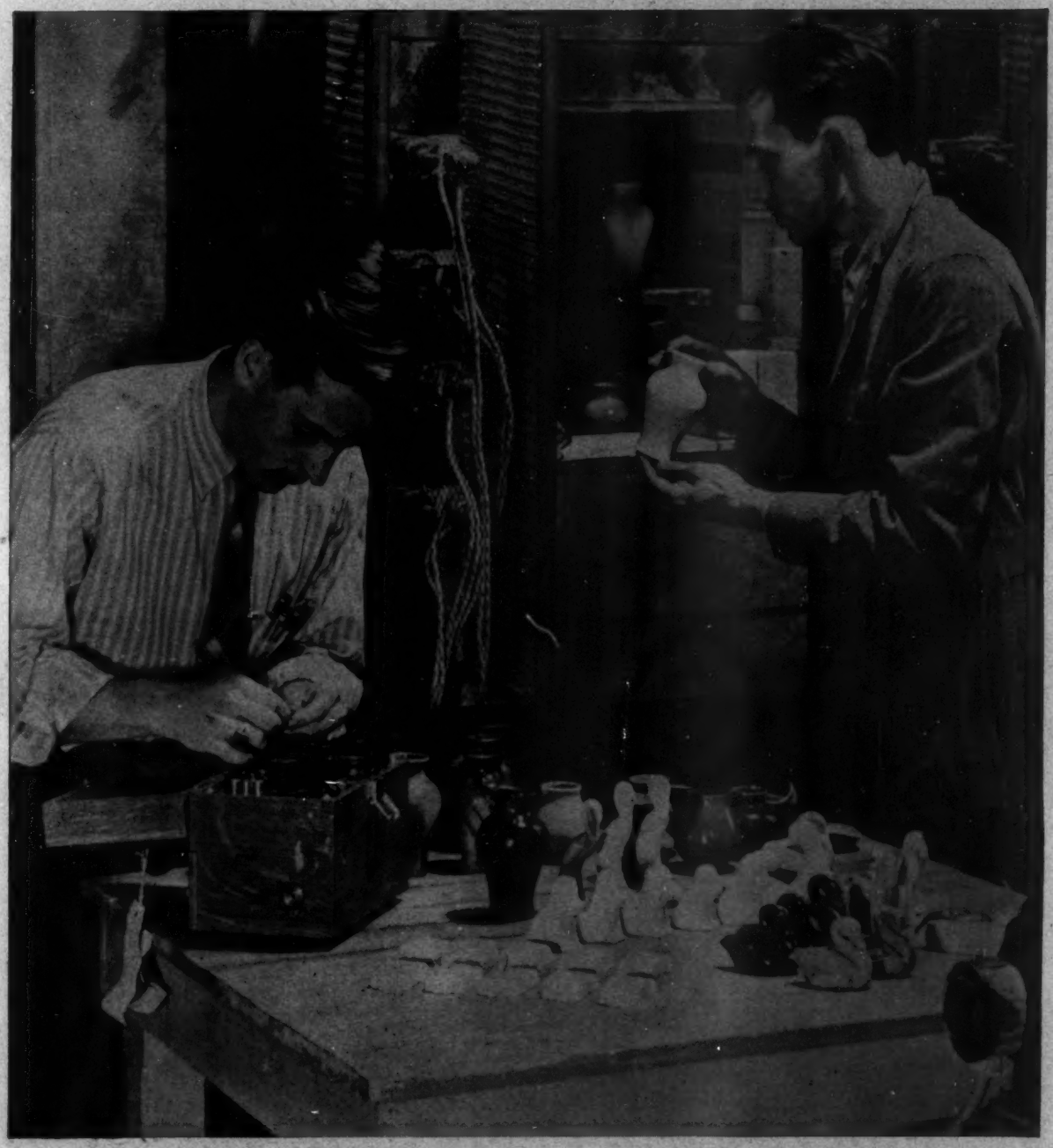

Installation with GLOBAR Elements at Iowa State College

Iowa State College, like other leading educational institutions, must have modern facilities to insure their students training in the very latest methods. Electric kilns are no novelty at Iowa State, in fact the kiln illustrated has been in service several years.

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Observes C. M. Dodd, Head, Department of Ceramic Engineering
Iowa State College of Agriculture and Mechanical Art

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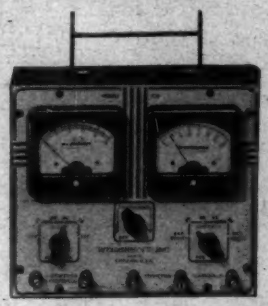

Makes possible quick tests and adjustments of generators within the voltage and current limits of the voltmeter and ammeter. Exact generator output is shown. Current draw of headlights, radio or ignition coil easily checked as well as voltage drop across any switch or wire.

POLE PIECE SCREWDRIVER

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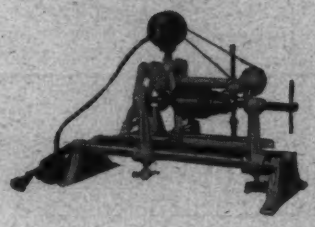
UNDERCUTTER



Undercuts commutators up to 6" diameter. Centers adjustable up to 18". Vee-blocks for centerless armatures. Sturdy steel horizontal support with machined keyway assures alignment and parallel movement.

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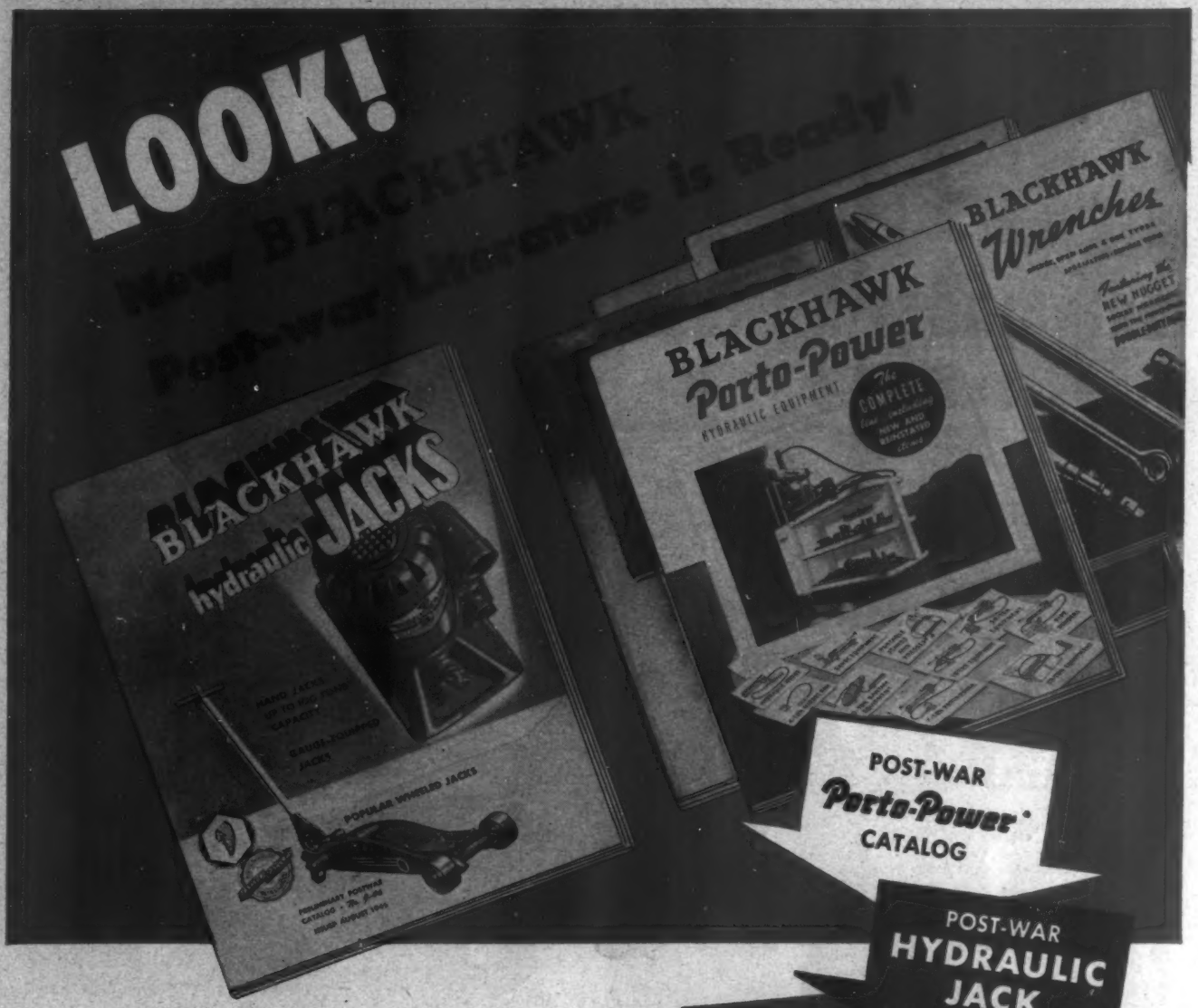

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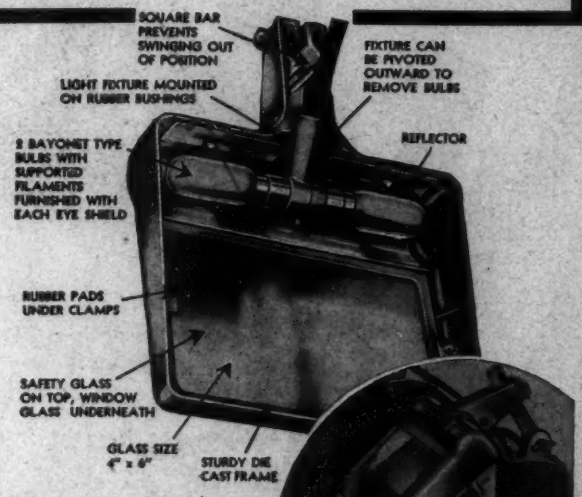
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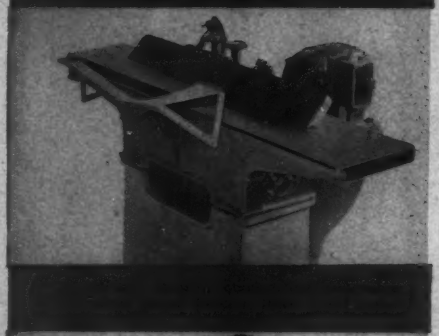

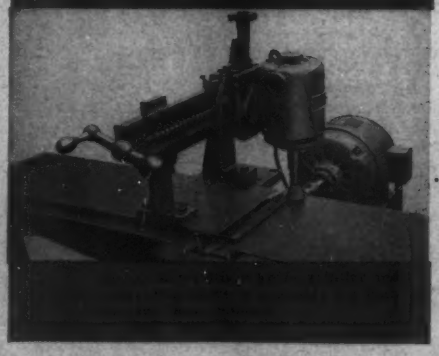

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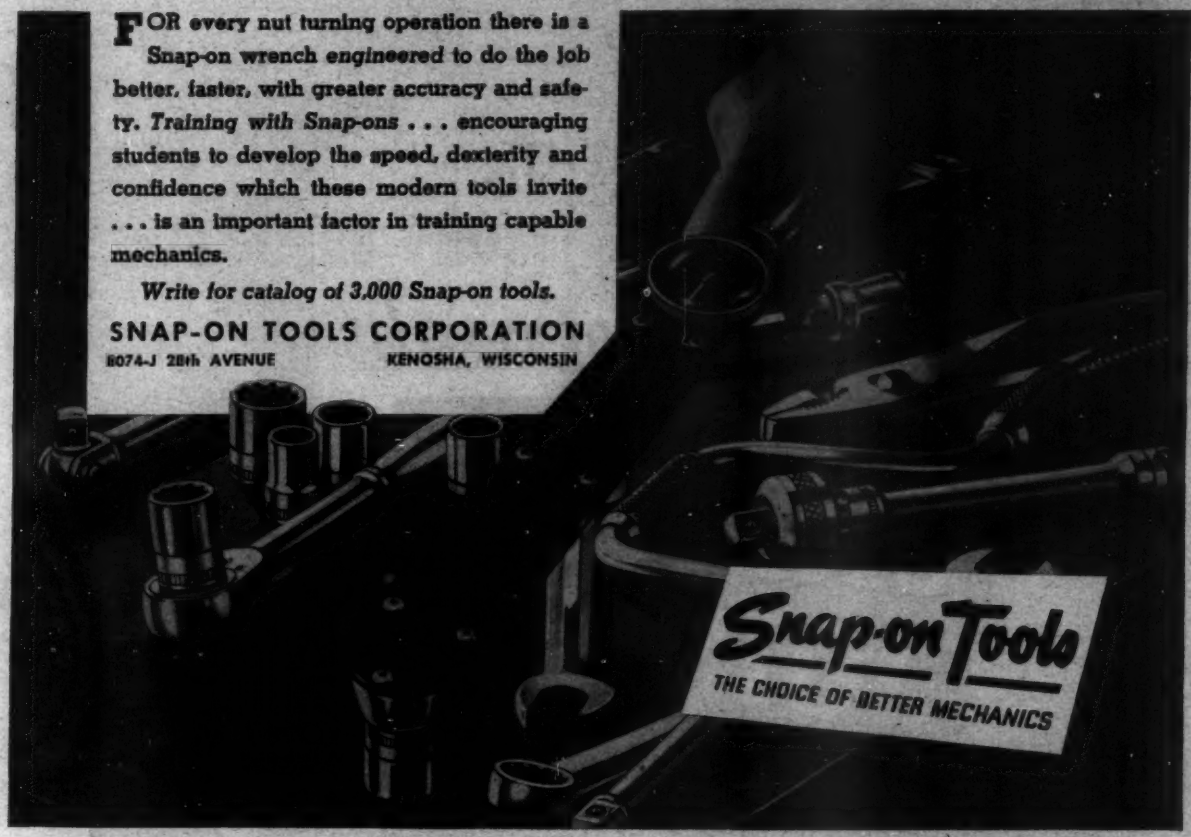

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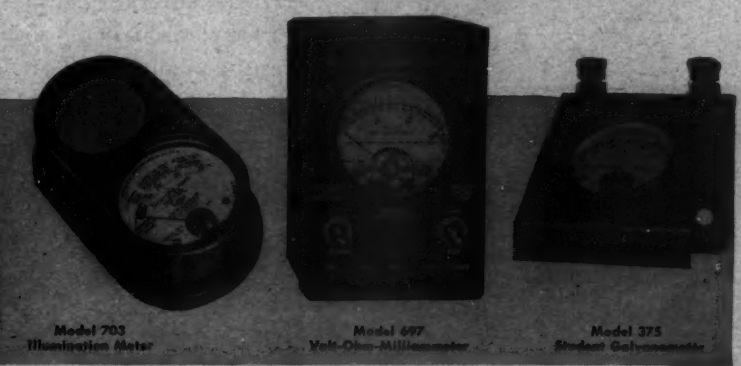

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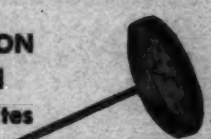

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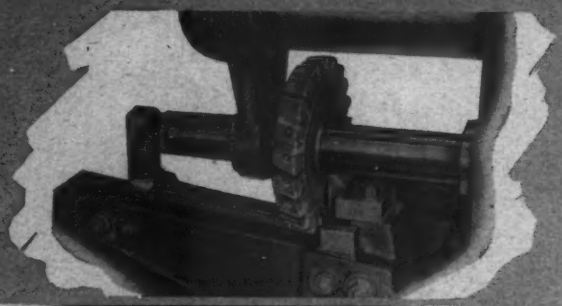

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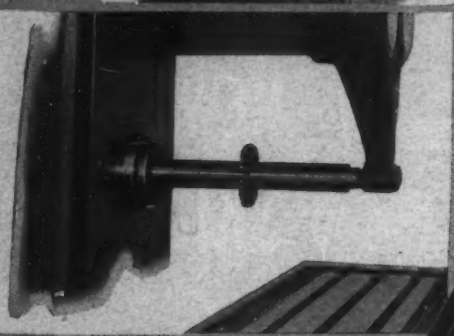

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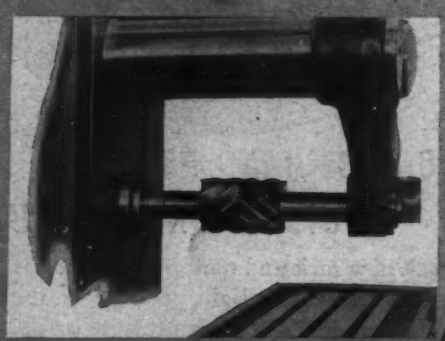

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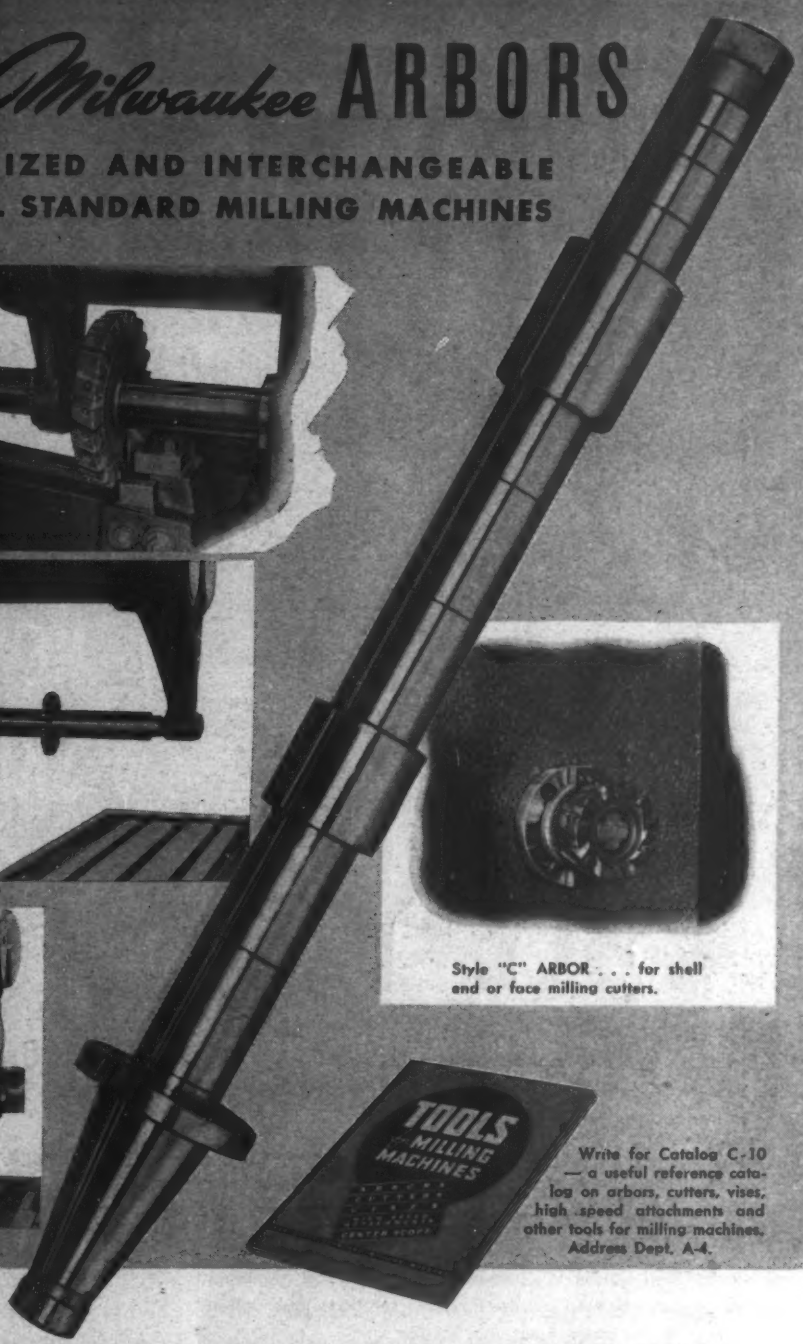

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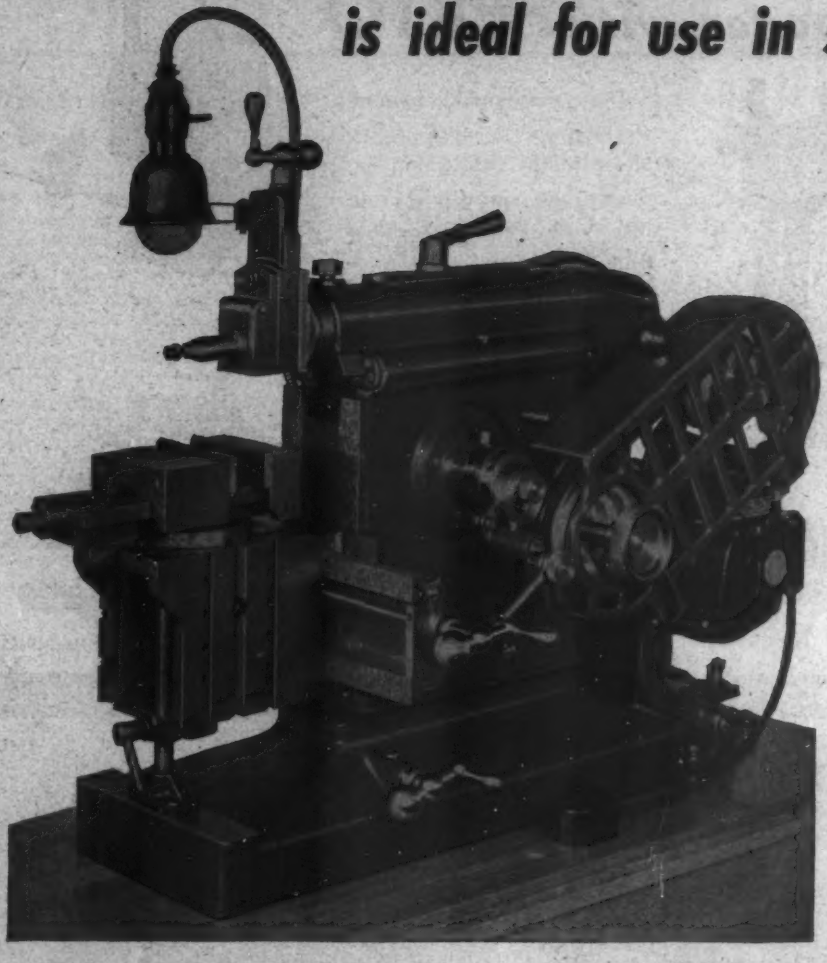

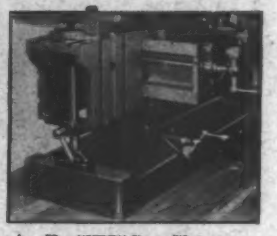

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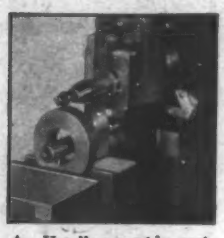

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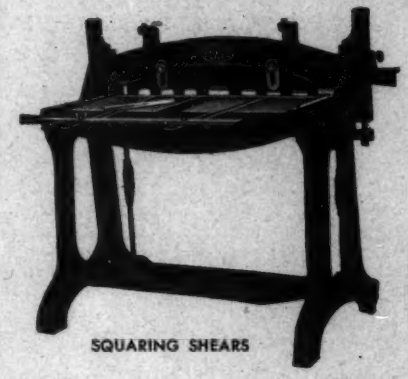

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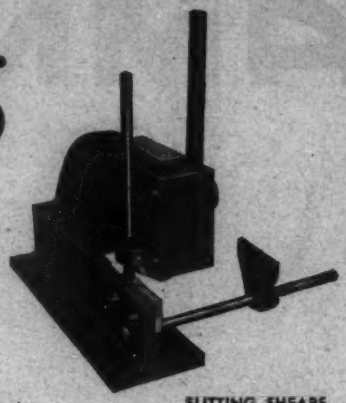

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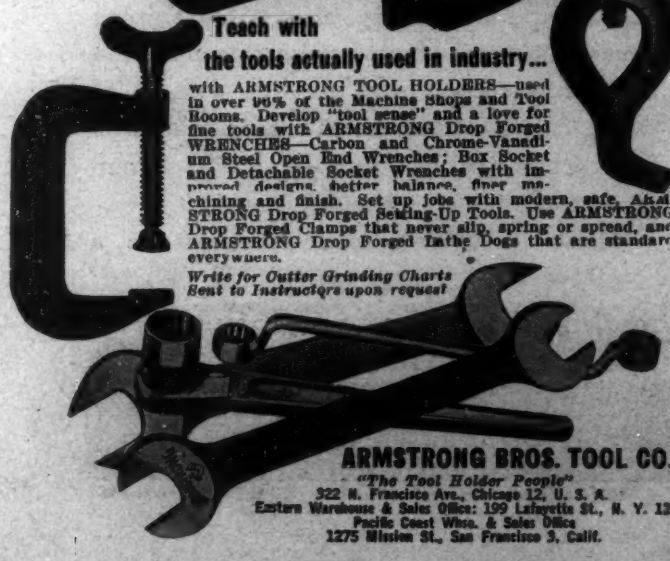

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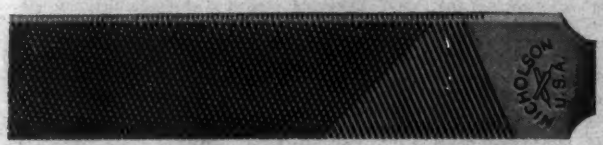

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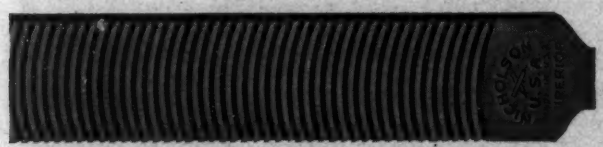

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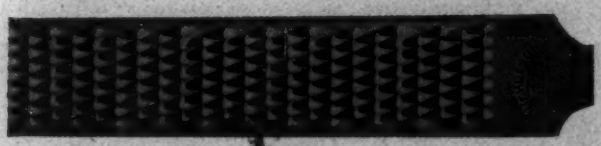

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is very anxious to publish general and personal news of the field. Unfortunately, the magazine is not in a position to send a reporter around to gather this material. The editor, therefore, asks every one of his readers to favor him with news notes of what is happening to himself, to his teacher friends, and in his professional association meetings.

Information of this kind helps to keep a continuous record of the events which mark the progress of our profession in the fields of industrial arts and vocational education.

Then, too, don't forget that the magazine is always looking for articles especially those on up-to-date projects in the fields of aeronautics, archery, auto mechanics, birdhouses, boats (full size and models), bookbinding, ceramics, drafting (architectural and mechanical), electricity, farm shop, games, leatherwork, linoleum block, machine shop, metalwork (art, electric welding, forging, foundry, gas welding), models (boat and airplanes), plastics, printing, stagecraft, radio, school and shop equipment, shop kinks, toys, upholstery, weaving and loom making, woodworking (cabinetmaking, carpentry, patternmaking, turning, and wood finishing).

This Month's Cover

The cover picture chosen for the October number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows Richard A. Oster instructing a student of the West Allis School of Vocational and Adult Education, West Allis, Wis., in the use of a hydraulically operated straightening press.

Photograph, courtesy of Blackhawk Mfg. Co., Milwaukee, Wis.

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Industrial Arts and Vocational Education

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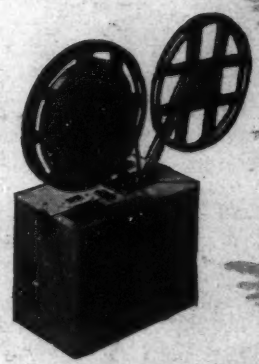

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Industrial Arts in the Modern Senior High School

*John A. Whitesel**

In a consideration of industrial arts in the modern senior high school it is well to examine a number of the different aspects of the program. These might well include such things as the scope and purposes of the senior high school, characteristics of the students in attendance, the nature of our society, objectives of industrial arts as an area of the program, suggested content of the industrial-arts offerings, and methods of teaching to carry out the objectives.

The Senior High School

First, what is the senior high school and what are its purposes? Administratively speaking, it usually includes school years 10, 11, 12, and sometimes 13, and 14. Occasionally it does go down to include the ninth grade. In other words it is a school for the middle and late youth ages.

The purpose of the senior high school is to educate youth — to help students reconstruct and reorganize their own inner lives so as to cope more effectively with their surroundings. All senior high school subject matter must contribute toward this goal or be thrown out of the curriculum. We have spent altogether too much time learning subject matter regardless of its contribution toward an individual's behavior in a society. Our emphasis must be on the individual and his adjustment for effective participation in his surroundings.

The Individuals

Let us look for a moment at the individuals who make up the senior high school. They are of all nationalities, races, creeds, and characteristics. Their ancestors are English, Italian, Greek, Polish, Russian, Scandinavian, German, French, Irish, African Negro, American Indian, and Asiatic. They are both boys and girls; some are healthy and strong while others are frail or crippled; some have I.Q's of 140 while others in the same school may have 80 or 90; some are mechanically inclined while others are not; some come from wealthy families, others from poor; and some are ambitious while others are lazy. There are many, many differences. And while there are common learnings that all must have, the students must be dealt with as individuals and not merely as a group.

One other point is that at this school level students have about reached the age of maturity and should be treated as grownups and not small children. They are ready to start doing the things that adults do and are anxious for a chance to get started. It must be kept in mind that they are the wealth of our future society.

The Society

In what kind of society do the youth of today live? It has been rapidly changing from a simple agrarian one to a society that is highly technical and industrialized. The young men who were in this war have learned to understand and operate technical machines far beyond the training of their parents. Furthermore, society will continue to be in a state of change and will also continue to move in the direction of greater technicality.

The senior high school program must gradually include more and more of a technical, mechanical, and industrial nature. Its students must acquire a fair understanding of our modern industrial occupations and the forces influencing them as well as their materials, tools, processes, and products.

We are living in a democratic society. We have emerged from this war believing in a free world for all men. In our democratic social order we place high value on the individual. We are dependent upon his intelligence. Each of us must work not only for our own good but for that of the group as well.

We are faced with many social problems that the youth of our generation will be called upon to decide. The school has a heavy responsibility in preparing youth to meet these situations.

Industrial-Arts Objectives

It is time now to look at industrial arts and its responsibilities in the senior high school. First, a definition of industrial arts is in order. It is one upon which all of the following remarks will be based. Industrial arts is a phase of the educational program concerned with orienting individuals through study and experience to the technical-industrial side of society for the purpose of enabling them to deal more intelligently with consumer goods, to be more efficient producers, to react more intelligently to problems of the social order, especially those related to industry, to use leisure time more effectively and enjoyably, and to have a greater appreciation of our material culture.

Here, the emphasis is on the individual and the particular changes that take place within him. We are more concerned with his adjustment to society than we are with any of the areas of subject matter in themselves. It is our job in the senior high school to help the individual adjust himself to the society rather than to place emphasis on the acquiring of subject matter or the learning of skills, alone. We have too often not been able "to see the town for the houses." We have placed all our emphasis on learning subject matter that was in a particular book, or on learning to use the tools that hung on the rack, and we have forgotten to tell the student whether and how these things might be used in solving his problems of living. Only as objectives for industrial arts take on the aspect of being dynamic or functional can they truly meet the needs of education for a free world.

Industrial arts must prepare the student to make more *intelligent decisions regarding consumer goods*. Every boy and girl going through the senior high school is going to need to know what and how to buy. Such training may be accomplished by a study of the products of industry today, including experimentation with the materials from which they are made and an examination of the construction and production processes as well.

Industrial arts must help the senior high school student become a more *efficient producer*. There is no thought here of encroaching upon the program of subsized vocational education. However, since the federal program reaches only a part of our senior high school students throughout the nation, here is an obligation of industrial arts which it dare not ignore. General mechanical and technical experiences and understandings will prove extremely valuable in a number of ways. In the years to come our occupations will include more and more of a scientific and technical nature. The ability to use tools, to work intelligently with machines, and to construct various forms are basic to success in such endeavors regardless of the particular trade or occupation one may later follow. Broad technical experiences in industrial arts give one an opportunity to know himself. He may discover in which of the industrial vocations he can make his most effective contribution.

Industrial arts must help prepare the senior high school student to better *fulfill his social responsibilities* in a free society.

*Associate Professor of Industrial Arts Education, Miami University, Oxford, Ohio.

The high school program should place emphasis on social problems that may be involved with each type of industrial activity undertaken in the school shop. A program of this kind should help make a student more familiar with various phases of our industrial society to the extent that he will be able to act and speak more intelligently regarding present social problems. The right kind of experiences with materials, tools, processes, products, and occupations of industry should help him form attitudes, habits, skills, and understandings so essential to intelligent living in a free, industrial society.

Industrial arts must help the senior high school student to make *better use of his leisure time*. As our industries become highly mechanized and labor is more and more plentiful, the hours of the working day are going to become ever shorter. There is probably no area of the senior high school program that offers greater opportunity for leisure-time activities than does industrial arts. Numerous avocational interests may be developed about the home through various mechanical activities and the use of tools and materials.

Industrial arts must help the senior high school student to *appreciate and make use of the material culture* of our civilization. For generations our ancestors have been spending their lives increasing the material culture of our society. As our civilization progresses this material heritage will become ever richer. The industrial-arts program must make the individual familiar with the accomplishments of the past and their significance for the future. He must be able to distinguish between our finer material products and those of inferior quality to the extent that he may intelligently contribute to a higher social level.

Content

The content offerings of industrial arts in the senior high school must be broad and, as nearly as practicable in the school shop, representative of the industries youth will encounter in present-day society. We can find absolutely no justification for a program of only one or even two narrow areas in industrial arts, in the modern senior high school, whether it be woodworking, mechanical drawing, or radio. The chief limiting factor in breadth of program, naturally, is the possibility of its being administered. This is a matter that each school will have to handle to the extent that its industrial-arts program approaches a representation of industries today and yet does not become so broad that it is a *hodgepodge* of busy work or a *three-ring circus*.

All content must be used solely as a means of developing the individual and not for its own sake. Some of the specific areas that might be justified in a program for our society today are broad experiences with metals and their processes and production industries; with electricity, radio, and other forms of communication; with woods and similar modern housing materials; with plastics and ceramics; with automotives, aeronautics, their operation and service, and other methods of transportation; with the different forms of graphic arts; and with drawing and blueprint reading.

Let us keep in mind that 10 or 20 years from now some of these content areas may have given up their places to others of greater educational value from the standpoint of sound objectives and the industries of that time.

One should not get the impression that all of these areas just mentioned must be carried on simultaneously in a small one-teacher laboratory. A small school may find it necessary to choose between some of these areas or might conceivably postpone some of them until a later date. Also, it is much easier for a teacher with advanced students to conduct a program of varied activities than it is for an instructor with beginners.

Teaching Methods

It is one thing to talk about objectives, but another to carry them out. What, then, must the teaching be like to accomplish the objectives of industrial arts in the senior high school?

First, from the standpoint of preparing students to deal intelligently with social problems, in a democratic society, we should show far greater respect and consideration for the intelligence, interests, abilities, and needs of the individual. Yet, there are senior high school instructors who spend the entire summer planning the projects their students will make during the coming year. The necessary parts are all cut out and tied together. In the fall the student receives the package of parts with a set of instructions to follow in assembling the project. This is preparation for a dictatorship and not a democracy where individuals are dependent upon their own intelligence. Every problem undertaken in a senior high school should have been selected and planned by the student with, of course, the guidance of the instructor. One of my favorite questions to students when I visit an industrial-arts class is: "What are you doing?" Not infrequently, the student will shrug his shoulders and say, "I dunno, the teacher's having me do it." I recall how the head of the mechanical-drawing department in a high school had a course worked out with 16 particular plates. All of his teachers were required to teach the same thing. I was told that for the past 10 years all the hundreds of students taking the course had drawn the same problems. Many of them scarcely knew what they were drawing. How much better it would have been if these teachers and students had discussed present-day industrial processes and products and then had co-operatively selected problems to draw that would have had a meaning for all of them. Too many of us have been guilty of doing as this drawing teacher did. We have been telling students just what to do and just how to do it. We have been preparing for a dictatorship and not a democracy. We have not been giving consideration to the individual needs, interests, and abilities of the students. The problems of the laboratory should grow out of the students' life needs today. Their solution should be the result of experimentation and decisions on the part of the students themselves. The teacher's role is one of a partner, a counselor and guide, ever watching to keep the student from going too far astray. His part should never be that of a dictator.

The teacher should have certain outcomes in mind and help guide the student work to bring them about. Yet, there are many teachers today who have no goals at all. They have no course worked out but simply let their students wander here and there whenever the circumstances happen to take them. While the more capable students may be able to think of it as a challenge, the weaker ones will become lost and their activities will be merely a lot of busy work.

If students are to become familiar with our modern society and its industrial processes and products, their work must be closely allied with contemporary industrial activities. Our equipment and tools must be of the same type that are used by present-day industry. They should be inexpensive enough that they can be changed as frequently as necessary to keep modern tools of industry in the hands of the students. The problems themselves must be taken from present-day industrial life. They must be just the thing the students are encountering in their experiences with the technical-industrial side of life. Too many teachers are permitting students to copy projects out of textbooks dated 25 years ago when these have no relationship to the student's needs and are made by entirely different methods of construction from those being used in industry today.

We must give more study to the products of industry and their inspection. This is especially true if we are to expect students to become intelligent consumers. We seem to have the mistaken notion that students must always be making something. Why not occasionally line up a number of new industrial products and run tests on them? Examine the materials from which they are made and compare the workmanship in them. We must place more emphasis on learning what kind of product to buy. Often, students spend two to four years in industrial-arts shops making things and still come out knowing little of anything about what to buy.

A great deal more emphasis must be placed on the study of materials, their characteristics and particular uses in present-day industrial products. Too frequently a student in woodwork knows only about the particular wood he has used; and the student in metals is not able to identify metals used in our everyday industrial products to say nothing of telling their advantageous characteristic.

The senior high school industrial-arts program must continue to place emphasis

on skills and a technical understanding. This is especially true where there is to be no other vocational program to follow. However, this must not be to the extent that there is no time left for emphasis on any other objective. Neither should the industrial-arts teacher permit his students to develop slovenly habits of workmanship. Such a teacher is just as much a menace to our profession as the one who stresses nothing but skills.

As a rule, a question dreaded by most teachers is to be asked by a visitor what objectives they are trying to carry out in their classes. They dread still worse to be asked to tell how they teach to carry out their objectives. Too many of us are willing to agree to a fine list of objectives but in our own teaching actually go right ahead doing as we have always done, stressing only one of the listed objectives. It is usually the acquiring of skills. That's the way we were taught years ago. We've found ourselves in a mire and we've never been able to get out. It is like lifting oneself out by his bootstraps. We must not forget that to accomplish the objectives outlined in this article will require an altogether different method from that of teaching skills alone. We must ever keep before us the objectives we wish to accomplish and then strive to conduct our teaching in such a manner that these goals will be reached, and that the accomplishments of the students portray that fact.

In closing let us remember that the emphasis in the industrial-arts program in the senior high school is on the student and his adjustment. It is a dynamic functional living thing and not a matter of static subject matter. It makes no difference how much technical knowledge we are able to get across to a student, if we have left him maladjusted to his society we have failed. The world has learned about atomic energy, but unless people are able to use it intelligently for our society, civilization will be destroyed.

Educational Aspects of Industrial Training

*R. B. Cribbs**

Education is a subject of many definitions, and when we attempt to describe it in terms of industrial training it becomes even more elusive. So, in order to discuss the educational aspects of industrial training, we must in fairness to our readers, pin it down in a way which seems to best suit our purpose. We like H. W. Beecher's interpretation:

> Education is the knowledge of how to use the whole of oneself. Many use but one or two faculties out of the score of which they are endowed. A man is educated who knows how to make a tool of every faculty — how to open it, how to keep it sharp, and how to apply it to all practical purposes.

In industry, we should be concerned with developing the whole individual because there are numberless practical uses for the tools which Beecher had in mind. Through the use of sound educational procedures which lend regard to adjustment, teaching, learning, and psychology, we hope to establish a set of conditions which will be conducive to individual growth. With adequate direction and control, we will have a better than fair chance of sharpening the employees mental and physical tools. Both employer and employee have a stake in the process because in order to stay in business at a profit and to pay decent wages, each individual must be more efficient than his counterpart with the competitors. Education is a master key to the problem.

From School to Industry

The move from school into industry is a critical milestone in the lives of men. They are entering a wedge in an unpredictable future — so much depends on the first adjustment. We have talked with men who have never recovered from the mental defeat of an unfortunate experience on the first job. Others have found it to be an exciting starting post from which they moved ahead to great accomplishments. We must grant that much of this variance is due to individual differences — particularly in the matter of personal capacities. Still, there are educational measures we can use to improve the chances of an early adjustment.

The vocational education groups are responsible for providing the right kind of an educational background. We in industry, hope to draw alert, mature thinking people from the schools. Too many times, they come to us with fixed processes and habits which are probably born of drill techniques. Whatever the cause, they are entirely out of harmony with our work environment. We would like to see more emphasis placed on straight thinking. Can't we impress them with the importance of accuracy in facts and encourage them to seek the whys of their actions? They should also understand the importance of safety, efficiency, and care of machines and tools. And perhaps, most important, we would appreciate getting people who have gained some semblance of maturity through their school activities.

We know that considerable progress is being made in this direction. We can't deny that it does represent a progressive form of education which will lend itself favorably to the adjustment of our people to jobs in industry. We can ruin most of your good work if we fail to do our part when they are placed on the pay roll.

Adjustment to the New Environment

While people coming into industry for the first time are introduced to new environment, different methods of communication, changes in control, and new subject matter, it doesn't necessarily mean that they are being exposed to a new type of education. If both school and industry are using progressive educational methods the transition should be a rather simple one.

Environmental Implications: People are modified for good or for bad by their contact from the start. We can promote or hinder, stimulate or inhibit their activities through the way in which we handle them in the very beginning. Loud noises, strange machines, new faces, and jumbled activity create for them an unreal panorama which tends to frighten and confuse. We can lessen the problem of adjustment through acquainting our new employees with a friendly person whose purpose it is to put them at ease and make them feel at home. Part of the job is to show them through the shop while explaining safety measures and reasons for the seemingly wild activity.

Communication: This first contact is usually with a gangleader or trainer who represents the bottom line of our line organization. To our new people, he represents their first line of communication. Through him they will meet other members of the line organization and work group. In a short time we can build a small circle of helpful people who will help eliminate a possible void. A new shop vocabulary will be acquired from this group which will strengthen understanding and ability to ask questions in the shop vernacular.

Control: In a short time the new em-

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ployees will come to realize that the line organization represents the control of all activities and operations. There is no more advantageous time to acquaint them with the fact that they and the control organization can mutually assist each other. And that, in reality, they have an identity of interests which should weld them into a smoothly functioning unit.

Subject Matter: The subject matter of instruction is clean cut and well defined. *Job breakdowns* tell us what needs to be taught — *timetables* tell us when it is to be taught. If the schools have provided basic similar job elements in their program, the learning time will be speeded up and confidence will be developed at a more rapid rate.

Continued Adjustment

Education is essential to our program of individual development far beyond the original adjustment. In a large concern, there are many pitfalls which can lead to a maladjustment of our oldest employees: *Fear*, brought on by new or complex situations and insecurity, is one; *Conflict*, aroused by personality clashes, is another; a third pitfall is *disappointment*. It is caused by disruption of personal plans, unsatisfied ambitions, unknown desires, etc.; a fourth, but by no means last, stumbling block is *frustration*. An example of it might be illustrated by the machines which may not be operating smoothly — a good man's production will be held down through no fault of his own. If we are to minimize such "bug-a-boos" as fear, conflict, disappointment, and frustration and thus clear the way for effective work, we must necessarily counteract them with a psychological and educational attack. For, after all, what causes them but a lack of understanding and poor administration?

Since we are dealing with individuals, and since the common factor in psychology is the individual, the immediate relationship is apparent. The interests, aims, and applications of any psychological approach should be directed toward the individual and his adjustment.

Hugo Munsterberg, Dr. of Psychology of Harvard University is the founder of applied psychology in industry; he claims it can serve helpfully through finding:

1. The best man for a particular job — *selection*.
2. Psychological conditions conducive to best work.
3. Producing influences on human minds which are desired by management — *attitudes*.

Selection

Inadequate selection can stymie our effort to allow a man to develop and use his faculties. Psychology can aid in placing the right persons on the right jobs. If proper testing criteria is used, tests can be of real supplemental aid to the older methods of placement. They uncover interests and latent abilities which can be used as a reference for present and future needs. In most industrial shop jobs the aptitude and achievement tests are the most easily validated. The aptitude test measures a native capacity which is valuable in uncovering native capacity which can be trained and, by the same token, eliminates those who haven't the capacity to be trained for a given job; the achievement test determines how well one can do a given task. It is at this point that we can recognize some of the tools — or capacities — to which Beecher referred.

Psychological Conditions

Our interpretation and use of applied psychology is not as broad as Dr. Munsterberg's. However, we do find that a knowledge of educational psychology or the psychology of learning and social psychology will aid us materially in handling our problems of education and training.

Any educator will argue that one of the essential principles of educational psychology is motivation — without it, training will have no meaning. The participants must want the information they are to receive and we must stimulate their desire for it. The need for earning a living is a very strong drive in itself, but supervision can motivate the men even further through helping them to see the advantages and importance attached to the work which is being planned. They can point out past achievements, possibility of advancement, special rewards, etc.

Our purpose is to establish an atmosphere of accomplishment. If our people are progressing in jobs for which they are qualified and which they feel are important, our chances of making positive impressions on attitude and learning will be much better. This is our approach to the law of effect.

We shall undoubtedly find that among many individuals certain incorrect job methods have become habitual; one of our problems is to correct this condition. According to the law of disuse or recency, men can dispose with bad habits through disuse. They can also stimulate the recurrence of right acts by practice.

Where can we find more abundant opportunities for practice? Earning a living is a continuous process of learning by doing. We can utilize the law of use and frequency through helping our people to perform correctly over and over again until the proper pathways have been irrevocably established.

Through the adaptation of partial activity we are using another educational factor of vital significance. In administering our program, we should seek to eliminate every single irrelevant factor, for progressive education strives for practicality.

These principles of learning can be applied in all areas of our total educational program — executive, supervisory, supplemental, apprenticeship, and on-the-job. However, it is not enough to simply know how to do an assigned job — ordinary training will take care of that. We need to encourage straight thinking; it is only through straight thinking that we can eliminate misunderstanding, distrust, and emotional upheaval. We must provide facts and we should encourage our people to seek them. If we can get them interested in the why, what, where, when, and who as well as the how of their jobs, we will be on our way to better understanding — through straight thinking.

Thinking, based on a knowledge of tools, machines, processes, standards, materials, products, plant and customer relationships, company objectives, mutual problems, etc., will help to erase the routine-habit stigma from most jobs. But most important, thinking and understanding, based on facts, will do more to bring labor and management together than any other single factor. Our methods for bringing this about are chiefly educational in nature.

For example: (1) it is essential that correct information is passed down through the line organization to the men on the jobs; (2) bulletins and letters can be used to supplement the daily contacts; (3) special pamphlets, magazines, and newspapers will assist in getting the information into the homes of employees; (4) special group meetings in which production problems are discussed will be an asset — labor-management production committees are becoming more common; and (5) annual reports are frequently used to good effect. These educational tools, as we have indicated, are designed to stimulate thinking. We hope to lift our people out of a humdrum void and so open the door for the individual growth which suits Beecher's definition.

Since we are discussing a total educational program, we can't afford to miss the social significance of the methods we have outlined. We mentioned the matter of getting understandable information into the home and community — this is a small part of our public relations effort. We all desire public approval of our working association because it gives us a certain status in our community. If our people are recognized as important in an industry which has a reputation of being a fine place to work, their general attitude toward the company should be quite positive.

There is still another connection between our industry and the community which we must consider as important. Both are actually joint partners in the development of the resourceful and effective life of our individuals. One third of men's lives are devoted to family, home, community, and friends and another third is given to their work association. Both are vital to people in their daily living. We should seek to correlate them. We can encourage our management groups to inform themselves on our employees' family status and community activities. Having, and intelligently using, such information will aid the understanding which we hope to promote.

Attitudes: As a concomitant result of our total educational program, we optimistically expect to realize positive growth of attitudes. For, essentially, we are dealing with them at their source of development. However, we can expect to make mistakes. Because this is so, and because industries and people are changeable and complicated,

we can never really find a 100 per cent situation in which everyone will be satisfied and happy. We feel, then, that there is another educational aspect of training which is worthy of mention; it deals directly with promotion of positive attitudes.

Careless supervisory administration can negate our entire educational program. Part of our effort should be bent toward impressing them with the importance of education and, also, with the nature of attitudes. Briefly, we want them to realize:

1. *That attitudes are developed around things that directly effect employees.* The way they think and feel about such matters as pay, supervision, jobs, security, advancement, environment, etc., will be reflected in their attitude toward the department and company. If we can adequately build a desirable reaction to these items we are well on our way toward a healthy situation.

2. *When attitudes come to the surface they are often evidenced by strong feelings.* For example, men may be working in a drafty corner — they decide that they don't like it and gripe. The gripe becomes a warning of an attitude which might operate negatively in other directions.

3. *The imitative aspect of attitudes can easily multiply our human relations problems.* This same group of men may succeed in getting others around them in the same state of mind — result, a group grievance. Worse yet, the men lose interest in their jobs while they are concerned about the draft. Here we have a negative attitude which is damaging to group morale and production.

4. *The desirable attitude is positive in nature and it can be developed.* This is a long story which will be analyzed in a later paper.

We have attempted to illustrate in a general way some of the educational procedures which are used to make our training program effective. It is evident that all people in our productive organization are, in some manner, involved. If soundly administered, such a program should conform a dignity upon our individual workmen which should inspire them to great productive effort. We are not alone in our conception of the importance of the individual in industry. James F. Lincoln, president of the Lincoln Electric Co. of Cleveland has this to say: "The antiquated theory that labor is a commodity, if applied, stops the development of men. Labor is man with boundless ability."

Organizing a School Print Shop

*Herbert Warfel**

There is no shortage of published material giving printing teachers information on how to attend to the strictly pedagogical side of their profession, and there are numerous textbooks on the printing trade itself to supplement the knowledge every printing teacher ought to have in regard to the technical side of his trade. Comparatively few efforts, however, have been made to help the teacher of printing organize his plant, his pupils, and his procedure for the combination instruction-production operations which is the life of most school print shops.

This series is not intended to be either scholarly or technical, but only to offer in an informal way some practical hints in this somewhat neglected field — hints which may be of use to printing teachers who have not yet encountered or are encountering for the first time, the practical difficulties of teaching printing.

A school shop of any kind is likely to be different from a classroom or a laboratory in that it does not contain identical equipment for each pupil, but rather has a variety of tools and machines in the operation of which the students rotate. A school print shop, is, of itself, different from other school shops in that so large a proportion of its material product is usable in the school and that actual jobs can be used in the place of artificial projects. For this reason, a school print shop is organized more nearly along the lines of a commercial plant than are most other shops.

Not that it can be entirely so patterned, since from its very nature, it is always populated with immature workers who lack professional skills. Its dual usefulness requires, however, that the print shop lean farther away from formal laboratory type of organization and more toward an industrial form than most other school shops. It is on that theory that these articles will be based.

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School Printshop Equipment

While no two school print shops are equipped alike, there is at least an underlying plan in the layout of school printing plants which is fairly general. There must be enough type on hand for the pupils to learn typesetting, and there must be presses provided so that the pupils can print the forms which they set. From that minimum, a school print shop may be elaborated to almost any limit. A more comprehensive layout may increase the complexity of the problem of organization, but it does not alter the fundamental necessities to be provided for. Usually (and wisely) pupils are taught to handset, justify, proof, and correct straight matter before they are permitted to undertake other and more complex activities in hand composition. They are (or should be) taught to make ready and print simple forms on a platen press. From there on, the variations in the activities engaged in will be more extended in scope but not much different in nature.

The minimum equipment for this purpose for any school print shop should be a 15-lb. font of medium-sized body type (10 or 12 point) for each beginner. I prefer 10 point, because it can be *justified* without the use of brass and copper spaces. A case and galley should be provided for each pupil to keep his type in. Much equipment can be used by several members of each class in rotation without difficulty, but not body type. Endless confusion always follows if more than one beginner has access to one case of type, or to any storage galley except his own. Of course, in addition to this body type, even the simplest school print shop will have a few fonts of display type as well as spacing material, rules, and ornaments, which might be used in rotation by different advanced pupils. But here, also, due care should be exercised to keep the number of pupils using the same material at a minimum. If there should be a large number eligible to use the display type, two or three series of it should be provided so that at least the members of only one class would have access to each outfit. With this type, of course, should be provided the appropriate number of sticks (one for each member of the largest group which would use them) and a liberal quantity of leads, slugs, furniture, quoins, and other composing-room equipment. Various textbooks give formulas for determining the proper amounts of equipment for a class. With these as a basis, modifications can be made to fit each situation.

Composing machines, especially slug-casting machines add to the productiveness of a school print shop and add to the course of study, much that is of great interest and value to advanced vocational students. Press equipment can, of course, be used in rotation for each class, but most school shops seem sadly underequipped in this respect. From the standpoint of instruction there should be one fourth or one fifth as many job presses as there are pupils in the largest group of beginners. Even if these presses are small, or second hand, it is better to have a sufficient number than only one large, expensive press which could be run by only one or two pupils at a time.

A Help to Orderliness

The printing instructor will have gone a long way toward the maintenance of orderliness in his shop when he has assigned the care of the various kinds of equipment to certain members of the class. Naturally, each pupil will be responsible for his own case of type and his own galley and should be obliged to return the stick, leads, and the slugs, which he may have used during the period of instruction, to the proper place from which he took them in the beginning. This, of course, puts upon the teacher the responsibility for assigning a specific place for practically everything in the shop when it is not in use.

If each boy is required to return the equipment he has been using to the place where it belongs, and in addition, each one is responsible for inspecting a certain part of the equipment before he leaves, so as to be sure that others have not failed to take care of their tools and materials, the teacher will have delegated a good deal of the checking up which would otherwise keep him from more important tasks. Of course, it will be up to the instructor to satisfy himself that the pupils who are responsible for inspecting the plant are doing their job and also foreseeing that careless pupils who are reported by the inspectors understand where to put their materials and form the habit of putting them there.

Students should only report carelessness to the teacher. The actual discipline cannot, of course, be anybody's responsibility but his. Ample time should be allowed at the end of each period for each pupil to tie up his type, put his galley in the rack, hang up his stick, and put away his leads and slugs, and do his inspection work. Pupils who fail to do so should be subject to discipline unless they have a very good excuse for their failure.

If a pupil has bad luck and pies some of his type, he should, if he reports the matter to the instructor, be given help either by the instructor or by some other pupil so that he can get his galley straightened up and his type tied up on time. If the pie is too extensive to be cleaned up by the end of the period, the instructor should permit the pupil to leave his galley out on the bank so that it can be taken care of by some member of the next class. If, however, the pupil who has had the misfortune does not report it to the instructor but puts the type away pied or not tied in his galley, he should most certainly have the seriousness of his defection explained to him.

There is no reason to make life more unpleasant for a pupil who is so unlucky as to pie a job, but there is reason to do so if he should try to cover the matter up instead of enlisting the instructor's help in attending to the matter at once. If the same pupil has the same kind of misfortune time after time, the matter may require some investigation and remedy. But even the best of pupils will, once in a while, pull a case too far out of the rack, drop his galley, or do some other hapless thing. In that case, what they need is not censure but assistance.

The First and the Last

The first few minutes at the beginning of the class, and the last few just before closing, are the most important periods in the print shop. It is true that there is very little teaching done at these times, but the first few minutes of a period is the time in which the teacher organizes his pupils and assigns the work to them; and in the last few minutes he inspects the work they have done, sees that their material is properly stored, and that the shop is left in readiness for the next class. If the print-shop teacher allows himself to be so busy with other things that he cannot get everybody in the class on the job at the beginning of a period, he is likely to find himself assigning busywork or making hasty assignments with incomplete directions in order to keep some restless pupils busy; or he may allow the whole class to get started on conversation and other social activities that will hamper their getting down to work when he does get around to making assignments. Experience indicates that 90 per cent of the disciplinary troubles in a school print shop are caused by the teacher's failure to see that everybody has something useful to do and knows how he is to do it.

The last few minutes of the class period are important because upon them depend the first few minutes of the next one. If type and sticks are left out on the banks, if stock printed during the period is not properly put away and accounted for and unprinted stock is left in such disorder that the next class cannot go ahead with it, it will be impossible for the teacher to get the next class promptly on the job. All this, aside from its physical disadvantages, sets up a big psychological handicap. Look well, therefore, to the beginning and the end of the class period, and teach as hard as you can in the middle of it and the next period will take care of itself — if you continue to do the same.

When the Cases Get "Dirty"

So far as I know, there is no school shop that has perfectly straight cases. Some are always "dirty," that is there are always some wrong letters in the right boxes or some wrong-font letters in the right cases, and vice versa. The question is: how close to perfection can we hope to come.

A useful rough test is to pick up 10 pieces of type from one of the most often used boxes in a case. If out of these 10, seven are the right letters of the right font, you can assume that the case is in as good condition as can be expected in a school shop. If, however, we get only five or six correct letters, then it is time to *straighten* the case.

This means that a crew of four or five students takes over the case, each takes a box of type into his galley, sets it up in his stick, lays aside the wrong fonts, and puts the wrong letters of the right font into the proper boxes in the case. Then when the whole box is cleaned, the type from the stick is returned to the box which he has straightened. He puts an inch square card into the box. This card carries the student's name and the date. For every two or three crews at this kind of work, one student who knows the sizes and kinds of type thoroughly, is given the job of keeping the wrong fonts distributed as the other boys lay them aside.

While this process disturbs the shop considerably for a short time, it causes less total confusion and less discontent among the students than would be the case if one or two students were compelled to take a long period of time to do the cleaning, and much less than continuing to use the *dirty* cases.

Toward the end of a semester many of the cases in the shop are likely to be pretty badly mixed up, and at such periods everything except the printing of dated publications should be dropped and the whole class should take a hand in straightening them up. This process should begin always with the small size of type and work toward the big ones, thus allowing the class to get the most disagreeable part of the work done first.

In a school shop it is pretty good practice not to have more than eight or ten pounds of type in any one case. A font which runs to 20, or 30 pounds, should be split up among four or five cases. A group of students will clean three or four cases holding 10 lb. of type in a good deal less time and with a good deal less discontentment, than that involved in straightening a single case holding 20 or 25 lb. The mere sight of so much type at one time seems to be disheartening. A good rule is never to have enough type in any box in a case of body type to completly cover the bottom.

"Who Done It?"

In fixing the responsibility for presswork so that a student who does his work well will receive credit for it, and so that the pupil who is doing careless work can be detected and the cause of his carelessness discovered, a definite record should be kept showing who does the make-ready on different jobs and who does the feeding after the make-ready is completed.

Quite often, when the identity of a student who is doing careless work is discovered, it is also discovered at the same time, that the reason for his poor showing is the fact that instructions have not been made clear to him. As in every other case of fixing the responsibilty, *the instructor must hold himself responsible for giving clear and complete instructions, and for being sure the student understands them as far as possible before he begins work.* Of course, there are many operations in which the student cannot really comprehend even the clearest instructions until he has tried to perform the operation a few times. This the instructor must, of course, keep in mind and make the practice a part of the instruction.

In keeping a record of who does the make-ready operations, a place might be provided on the back of the "job ticket" or

job card; and except for the more advanced students, the pupil who does the make-ready should get an O.K. from the instructor before the job is put into production. At this point the instructor will have a very definite check on how well he has taught make-ready and on how well the student has understood his instructions.

Each feeder, after the presswork is started, should make a record (which can be kept on a very simple form) of the time he started, the time he stopped, and the impressions he produced. This form should be filled out as soon as he is finished with the *lift* he is responsible for, and the form should be slipped into the pile that the student has printed. In this way, whenever the job is inspected, whether it be before folding or before gathering, or before the job is wrapped up for delivery, there will be no question as to which pupil has done which part of the work.

This, however, should not relieve the teacher of the necessity of inspecting several times while the presswork is in progress, so that if the student has not understood his instructions or if he is just naturally careless, the fact can be established before he has had time to spoil a large part of the run.

One of the most difficult things to improve in teaching the printing trade is the student's ability to tell when a job has too much or too little ink. The difficulty with which a student learns this is not so much in proportion to his lack of intelligence as it is to his experience in presswork. It is a matter that requires time and a good deal of spoilage before the pupil finally developes an *eye* for the proper amount of color. No student is intelligent enough to learn this without a good deal of practice, and no student is so dull that he cannot learn it in time.

One of the advantages of fixing definite responsibilities for particular pieces of student work is that it improves the quality of the teacher's work. If a teacher is going to hold a student responsible, he must himself be very definite in assignments, and must be sure in his own mind that the student knows exactly how to proceed. When the student needs instruction, the instructor must in all fairness be sure that the instructions are clear and complete before he can expect to make the student responsible for carrying them out.

The Comprehensive Industrial-Arts Program

*Franklin H. Gottshall**

It would be interesting, perhaps, to conduct a survey in high schools in which the industrial arts are being taught, and find out, if possible, the purposes and objectives of the programs being carried on. The chances are that there would be considerable disagreement even on points such as to the amount of time which should be devoted to the industrial arts in the high school, the number of hours per week, and the number of years.

If we agree that education is knowledge imparted through instruction, observation, and experience, resulting in the improvement of the physical, intellectual, and spiritual faculties of a person, then it may be well to ask: "Does the industrial-arts program in your high school meet the conditions set up by this definition?"

Industrial Arts Defined

Before this question can be answered, the term — industrial arts — must be defined. Arthur L. Reagh, in a magazine article,[1] "A Supervisor's Viewpoint of Industrial Arts," gives a good definition of the industrial arts when he states that: "The industrial arts is an area in general education, which meets the needs of pupils for experiences in the use of materials, tools, equipment, and a knowledge of the processes of industry and their social significance to the community." He adds as an addendum to this that, "It is an area not covered by any other phase of general education."

This definition does not mention the creative aspects of industrial arts, but aside from that it does give us a fair concept of the field.

With this definition before us, we should be able to judge for ourselves whether the industrial arts are needed in our educational program.

"Education is knowledge imparted . . ." Industrial arts is knowledge—knowledge of a special kind, but useful knowledge about materials, processes, products, and creative forces which make industry possible. In deciding whether such knowledge is important, essential, or of little consequence, one must consider, we think, the importance of industry to society as it is at present constituted. How important is industry when compared with the other pursuits which make up our daily existence? How compare knowledge of it with art, religion, languages, history, law, government, when measured and judged by their contributions to our well-being? What does it contribute to the physical, intellectual, or spiritual improvement of the human race?

Industrial-arts teachers when called upon to defend their programs may be swayed by emotionalism to make claims for the program out of all proportion to its actual worth. In weighing relative values the industrial-arts program can probably claim no more for itself, as an educational device, than can any other art or science. Nor need its prestige suffer on this account. It has its place in the sun, which place, we think, is neither more nor less important than that of any other branch of educational endeavor. Viewed thus, in its proper perspective, the contributions it makes to the field of education as a whole adequately justifies its inclusion. It is, in short, one of the supporting pillars, among all of those necessary in a well-rounded-out educational structure.

The truth, as we see it, is that all educating is a vast integrating process in which all fields of knowledge must be adequately appraised, and pursued, so that each may contribute its full share to the process of improving our people and the world in which they live. No field can stand alone and claim superiority for itself, if all are presented and administered with equal diligence. Furthermore, every field of general education contributes something, or should do so under ideal conditions, to every other field, for there is a much closer relationship between many of them than most people realize. For example, there is an intimate relationship between the progress of industry and the progress of history. A study of history for the whole four years of high school could almost be predicated on the rise and growth of industry. Our culture, our laws, the fine arts, have all been greatly affected by the progress and processes of industry. Industry has had its effect upon the spread of religious teachings by speeding up communications, and by inciting wars, and promoting the prosecution of wars. Though war is in many ways a heathenish and terrible thing, what works of man could have more speedily caused the spread of the doctrines of Christianity throughout the hitherto inaccessible regions of the earth than the recent world-girdling conflict?

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[1] *See* INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, May, 1943, pp. 186–189.

The industrial arts with their close relationship to industry itself, constitute a vehicle, a cog, in the field of general education, and has in ever increasing measure been accepted as such by leaders in the educational field.

If we concede the value of the industrial arts in the general educational field, then what should be our objectives in setting up an industrial-arts program in our high schools? The objectives should be based: (1) upon the needs of the community; (2) upon the needs of the students.

In this connection, D. Arthur Bricker, in a recent magazine article[2] feels that three things should be taken into consideration: (1) the types of industry and occupational pursuits of the community or area; (2) the type of population found there; (3) the educational facilities available.

Industrial Arts and the Community in Which it is Offered

From having taught and worked in a number of widely separated localities, the author has gained some firsthand knowledge concerning the differences in emphasis and curriculum content occasioned by the geographical position and the occupational tendencies of various communities. In New England and the Middle Atlantic states, where manufacturing is the chief occupation, all branches of the industrial arts have had rather wide acceptance in the schools for many years. In no other section of the United States are there so many schools offering such a wide variety of industrial-arts subjects. Industrial and mechanical pursuits are not only the occupations from which most families derive their livelihood, but such pursuits play an important role in the leisure-time activities of many families.

In the Pennsylvania-Dutch community where the author at present makes his home, a majority of the people work in some manufacturing enterprise. Being thorough workmen and good mechanics by tradition and training, these people, of Germanic origin, find their services in constant demand, so that a considerable part of their leisure time is devoted to avocational pursuits demanding mechanical skills or artistic ability, as well as to hobbies in which this is true. In many cases these avocational pursuits differ essentially from their regular vocational pursuits. Being exceedingly thrifty people, they turn their avocational interests into profitable undertakings in many instances. Many repair furniture or restore antiques; others repair radios, make pottery, repair automobiles, or build miniature models. One woodcarver has sold his wares in most parts of the United States and in many foreign countries as well. In view of all this, it is not surprising that the industrial-arts programs in the high schools of this section are highly regarded; nay, insisted upon as being essential in the school curriculum.

In New England, similar conditions exist. During the year in which the author lived in New England, he numbered among his friends a fire engine salesman who repaired clocks, even to replacing worn-out wooden gears, or tempering springs; a factory worker who financed his daughter's college education by refinishing furniture; a retired carpenter who restored valuable antiques; a wood carver whose hobby was carving plaques of famous buildings and historic landmarks; a blacksmith who did artistic wrought-iron work; a train dispatcher who had a flourishing business raising cut flowers; as well as others with hobbies too numerous to mention. Thus the industrial arts having reached a high state of development in practical life, are widely accepted, and great varieties of subjects are offered in the schools.

In schools of the middle west which the author has visited, he found almost as much progress in industrial arts as in the east, though more emphasis was put on agriculture, the emphasis being on farm mechanics, tractor repair, farm blacksmithing, and similar subjects in a greater number of cases than in the east.

In the south where the author has taught for many years, the introduction of industrial arts into the public schools has been disappointingly slow, even where communities seemed well able to afford such a program.

In many cities of Georgia, for example, where cotton and textile mills flourish, it would seem logical to offer a wider variety of industrial-arts programs related to the textile industry, such as courses in weaving, for example. Weaving and spinning are still carried on quite extensively in some sections of the south as a home industry. In northwest Georgia there is a section where bedspread making is a flourishing home industry, but so far as the author knows the schools have done very little to take advantage of a situation which seems to offer wonderful opportunities for service. Georgia has excellent pottery clay and it seems that courses in ceramics could be easily introduced as an industrial-arts subject, as it has been in some sections of southern Ohio. Basketry, wood carving, and chairmaking and seat weaving, are pursuits for which these people seem to have a natural talent as the author well knows from having taught them. These subjects should be introduced into more of the public schools in this region. Materials are close at hand and inexpensive. Tools needed are few. The know-how and the will to start are the chief requisites.

One thing which has retarded growth of an industrial-arts program in the south is the lack of adequately equipped and adequately staffed teacher-training schools in this field. Until this dearth of facilities is alleviated, the problem will not easily be solved. Teachers of the south whom the author has taught show great interest, and have as much ability along these lines as teachers of any other locality. What is needed is greater vision among administrators, some investment of funds for adequate facilities, and proper teacher-training programs.

Objectives based upon the needs of students could be compiled into a list almost without end.

We have stated before, but it bears repeating, that the ideal objectives of an industrial-arts program are not greatly different from the objectives which should be aimed at in any other field of general education.

Industrial-Arts Objectives

Homer Smith recently published a list of six industrial-arts objectives.[3] They are:

1. To develop skill in the use of common tools.
2. To afford industrial information and social intelligence.
3. To foster appreciation of good materials and workmanship.
4. To further intelligent choice of life occupations.
5. To inculcate worthy personal traits and attitudes.
6. To provide a measure of specific occupational training.

To these many more can be added, such as:

1. To prepare for worthy home membership.
2. To engender creativeness.
3. To stimulate worthy leisure-time activities.
4. To promote health (mental and physical).
5. To develop intelligent consumer habits.
6. To stimulate appreciation for beauty, art, and culture.
7. To promote honesty and integrity.
8. To provide means for self-analysis and growth.
9. To teach frugality.
10. To stimulate interest in other school activities and subjects.
11. To create thirsts for scientific knowledge.
12. To teach lessons of change and progress.
13. To teach habits of good "housekeeping."
14. To teach co-operation.
15. To provide vocational guidance.
16. To help the mentally retarded and the physically handicapped.
17. To provide an outlet for the latent abilities of the student with the high I.Q.

The list could be made much longer, but this will not be necessary. In this discussion of the subject, space is not available to take up every one of the items we have listed, but we will discuss a few at random. You who teach industrial arts will have little trouble in taking up where we leave off.

We have often heard it said: "Oh, if I could only teach pupils to do original

[2] D. Arthur Bricker, "The Development of a Program for Industrial Arts," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MAGAZINE, May, 1944, pp. 107–112.

[3] Homer Smith, "Industrial-Arts Objectives," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MAGAZINE, Feb., 1944, p. 52.

thinking!" Creativeness is certainly a desirable trait in students. And no field in general education provides greater opportunities for originality than do industrial arts. In order to make something with their hands and do a creditable job, it is essential that a considerable amount of originality in thinking and planning be applied to the problems. This refutes, of course, the erroneous concept of the *raison-d'-etre* for an industrial-arts program in the public school, once held by so many; i.e., solve the problem of what to do with the dull, the unteachable boy by relegating him to the industrial-arts classes. To be sure, industrial-arts classes may help solve many such problem cases, but not because of dullness or unteachableness. They may provide the stimulus which other subjects failed to provide in bringing out the good qualities in the boy, qualities which were always present, but were undeveloped.

A certain boy was once enrolled in the author's class, who "could not learn anything." He had made no progress in any class in high school, so he was enrolled in a class in woodwork. In the course of a year he surpassed most of the boys in his particular section both in skill, in quality of product, speed of execution, and quantity turned out. Prior to entering the class he had been threatening to leave school, but his interest in shop induced him to remain in school at least a half year longer than he would otherwise have done. He learned to read and interpret blueprints and instruction sheets, since this was required for progress. Yet, it had been reported that the boy couldn't learn to read. He showed considerable intelligence and originality in the execution of his tasks. He executed duties requiring some elements of leadership and responsibility. In many ways his work showed that somewhere along the line his education had been grossly neglected.

A great deal can be said for the industrial arts as a motivating force for stimulating an appreciation for beauty, art, and culture. The author feels that a great deal more could be done by most industrial-arts teachers in improving the design of their projects. Recent books, and professional, and hobby magazines have done a great deal to foster improved design, but great improvement is still possible.

Students react favorably to the stimulus of beautiful things if the opportunity to make comparisons is given to them. Many, if not most of them prefer to make things which show good taste in design. It is important that they be taught the difference between design which is poor and that which is good, for the same reason that it is the responsibility of the school to teach them to appreciate good music, good art, and good literature. Naturally, the inexperienced mind, the uninstructed mind, will make poor choice and often decide that a badly designed or a poorly conceived project is pretty. For example, pupils seem to like to make turned projects from built-up stock of woods of different colors. These zebra-striped atrocities appeal to the untrained color sense of young people. Such pieces are gaudy, cheap looking, and show a lack of discrimination in the employment of color and design. If proper comparisons with projects of good design are made, it is seldom difficult to improve the student's sense of values.

Many students do poor work in school, but utterly fail to perceive why they have failed. In most subjects they find it almost impossible to retrace their steps to a point where they took the wrong direction and thus rectify their mistakes, since with large groups and schedules to be met it is impossible to permit an individual to disrupt a natural sequence which the group as a whole seems able to cope with. Thus, the slow pupil often stumbles along from one failure to another until he becomes hopelessly discouraged. Still others could do much better work than they actually accomplish if they had some concrete evidence of past accomplishments always before them, so that they would have something upon which to base plans for future improvement.

Industrial Arts Encourages Self-Analysis

The industrial arts offer splendid opportunities for self-analysis and growth. It is fairly easy for a boy who has poorly made a drinking cup or a quart measure to see where he has failed; and his chances of being able to determine the places in the procedure where he was in error, or where his thinking was at fault, are reasonably good. The evidence is before him. He has the opportunity to examine it, to compare it with other work, better or worse than his own. There is the opportunity to retrace his steps, to rechart his course and try again; and if he does better the second time (and the chances are good that he will), he has the satisfaction of seeing the evidence of his success unfold before his eyes.

One of the most important contributions of an industrial-arts program is to stimulate interest in other school subjects and activities.

Mathematics is to too many students a very dull subject, devoid of interest because the goals attainable are not very clear at the outset. Little incentive to master the difficult subject under such circumstances exists. This may be equally true of physics, or chemistry. But, let the boy find that he needs a knowledge of mathematics to help him solve problems in the machine shop, a course which he likes, and mathematics will be viewed by him in an entirely new light. In the machine shop the factor which motivates the boy is the chance to operate mechanical equipment; always a strong motivating force to boys. Certain operations which he must learn to perform in order to become a skilled operator require considerable mathematical knowledge. The same is true in certain advanced courses of electricity, carpentry, and other industrial-arts subjects. An interest in chemistry could be fostered perhaps, through a course in metalwork in which coloring and finishing of various metals is accomplished through various chemical processes.

Properly taught, a course in furniture design would almost certainly stimulate an interest in history, in art, or in architecture. Related information on many of the products and processes of industry; information which should be a part of all properly planned industrial-arts programs, should stimulate considerable interest in geography, science, and other subjects. If the boy's reporting or writing about these subjects is properly planned, or if he is given the opportunity to publish reports on some hobby acquired through his work in industrial arts, it may stimulate in him a greater respect for grammar and English courses which he is required to take.

We haven't room here to prove the validity of all of the objectives which we have listed. Those already touched upon should suffice to show the value of the industrial arts as an area of general education which deserves every form of support that can be given to it.

How to Organize the Industrial-Arts Program

Assuming, then, that we have made a case for the industrial arts in the educational program, what can be done to so organize it that it will take its place as a forceful instrument of instruction? Several things are necessary. First, there must be provided an adequate plant, which includes shops, equipment, and materials. Second, the curriculum and teaching devices must be carefully planned. Third, there must be good organization and a properly trained teaching staff. Fourth, the public should be kept informed and kept up-to-date on what is being done in order to insure public support of the program.

Once the types of courses to be offered have been decided upon, it will be necessary to provide suitable shops in which to carry on the work. These should be carefully planned before being equipped. The ideal situation in planning a shop is, of course, to be able to build a new one and plan it so that working conditions will be ideal. The author knows from personal experience in remodeling a number of old shops, how poorly arranged and planned many of them are. A poorly planned shop is a great waster of time and energy, both for the teacher and the pupil.

Often, because of lack of funds, it is necessary to convert a basement or some other poorly lighted, poorly adapted room into a shop. In many such cases the one who plans the shop must do the best he can with what is at hand. Much can be done by proper planning, of course.

By far the most ideal plan is to have the shop in a separate building, or in a wing of the main building which can be segregated from other classrooms. The shops should be planned specifically for the work which is to be offered. Building codes will, of course, make some mandatory de-

mands which must be met, but in addition to these there should be large windows and enough of them. These should be provided with shades or Venetian blinds in order that the amount of light which enters the room may be properly regulated and direct glare eliminated. There should, in all cases, be careful provisions for good lighting. A poorly lighted shop is a place where dangers constantly lurk, and where the best eyesight may be easily impaired. The assumption that dim lighting is restful to the eyes does not apply to the workshop, for one goes there to use his eyes, not to rest them. Poor lighting causes fatigue and results in poor work. The author is constantly amazed at the large number of dark walls which he finds in school shops, walls which absorb as much as 50 per cent of all the light which enters the room. Light pastel-colored walls and ceilings are desirable, and properly installed fluorescent lamps are ideal. A clean, well-lighted shop is an efficient shop, all other things being equal.

Where noisy machinery is constantly being operated, the ceilings should be quite high, or special noise-absorbing material should be used on the walls and ceilings. Shops where there is a great deal of dirt, such as woodworking shops, should have efficient dust-collecting systems installed. This not only avoids wasting a lot of unnecessary janitor service, but more important still, it promotes health and efficiency. Too often this essential equipment is entirely omitted, or the type provided is so inefficient as to be almost worthless. Too many shops are planned on the basis of, "We'll get a little equipment and make it do for a start, and later we'll get more." More often than not, more students are crowded into such shops, but little or no additional equipment is provided.

Planning the Industrial-Arts Shop

Many shops lack even the bare essentials necessary to make good shop-keeping possible. Sufficient storage space is seldom provided by the architect unless the shop teacher is consulted when plans are drawn. The efficiency of shops is greatly impaired by lack of storage space, and storage facilities, such as supply rooms, lumber racks, cupboards, and cabinets in which to house supplies and partly completed projects. These should be in the shop or directly adjacent to it and accessible through a door from the shop, instead of having them located in some far-off corner of the building. Auxiliary workrooms, such as finishing rooms, glue rooms, lecture rooms (with comfortable seats and blackboards) should also be accessible from the shop with nothing more than a suitably sized doorway separating the two. Lighting and working conditions in these additional rooms should be similar to those obtaining in the shop. In planning shops it is always wise to remember that students labor under sufficient handicaps just in going through the learning process, and unnecessary handicaps such as obtain in inefficiently planned shops should not be added. Cement floors are fireproof, but they have little else to recommend them in a shop. Some other floor covering should be superimposed upon them.

Machinery should be properly placed for efficient work. In a woodshop, for example, the cutoff saw, ripsaw, jointer, and planer, should be close to the lumber racks. Lathes, band saw, and other machines used mostly in finishing operations should be close to the workbenches. Sufficient working space around each machine must be provided for safety and for efficiency.

Good workbenches, with large, flat, heavy tops should be provided, with enough room between the benches to avoid unnecessary crowding. For some kinds of work, metalwork, for example, benches may be built along the walls. This usually provides good light if provision has been made to keep out sun glare. It is a very good idea to provide tool storage and locker space underneath all workbenches. Too much time is lost in many shops in getting necessary tools from a toolroom and carrying them to the workbenches. Essential tools, needed every time the student comes to class, should be given each its special place in a drawer or rack right in the bench where it is to be used. Easy checking is possible, if individual places are provided for each tool.

The problem of tool and material-in-process-of-construction storage is an important one. The author has seen many shops in which the problem is very poorly handled. Too much time is usually consumed in traveling between the place where tools or project material are stored and the place where they are to be used, or in waiting in line at the toolroom. After having thoroughly tried out both methods, the author feels that the ideal way to store tools and materials is in cabinets to which every student has easy access. Crowding is avoided if the essential few tools which he uses every time he comes to the shop, are stored in each bench as has been previously advocated. Project material belonging to one class or section must be locked up to make it inaccessible to other groups, in order to prevent damage or loss. Tool cabinets should be so planned as to make rapid and accurate check-ups possible. They should have glass doors, light interiors, with an individual rack, hook, or place, for each tool. The profile of the tool or its name should be painted on the background where the tool ordinarily hangs. This system makes each tool readily available and checking is easy. Toolrooms waste time, and contrary to general belief do not prevent tools from being lost, misplaced, or stolen. Unless tool boys are properly trained, or are unusually reliable, they will be more of a liability than an asset. It is hardly fair to a boy in any class, if he is required to serve in the toolroom long enough to make a good tool boy out of him; yet unless this is done the toolroom will be very poorly kept. When tools are accessible to every student, arranged in an orderly manner, and regularly checked and inspected there is little chance for confusion, and a negligible loss of tools.

The Unit Shop vs. the General Shop

The type of shop must be considered. Should it be a unit shop where only one activity is taught, or should it be a general shop in which many activities are carried on. This depends greatly upon the results we wish to achieve. The real general shop is one in which a number of types of activity are being carried on concurrently. If the classes are not too large and if teaching devices are properly organized, a general shop can be run efficiently. The author is inclined to believe, however, that the unit shop, or the type of so-called general shop in which only a few closely allied types of work are carried on simultaneously are the best.

There are a number of very good reasons why the author has held to this opinion. First, he has found that certain types of activity, such as the pounding on metal, distract the mind of those engaged in some other activity, such as mechanical drawing, for example. The greatest objection to the general shop, from the author's viewpoint, is that to function at all, most of the instruction must be provided by instruction sheets. In spite of all that can be claimed for instruction sheets, the industrial-arts teacher of experience knows only too well that a great deal of help from him is needed by students in every stage of their activity, and trying to supervise too many different activities simultaneously is like having too many very hot irons in the fire at the same time. The advance preparations that have to be made to carry on just one activity at a time are often enormous in industrial-arts subjects; in fact, often as much time is spent in preparation for a class as in actual teaching. The more activities, the more preparation that will be needed, else the work will suffer, and this holds true whether many or a few are engaged in that activity. From actual observation and personal experience the author has reached the conclusion that the many-activity general shop tends toward confusion; accomplishments of little worth, since sufficient time is not available to make anything worth while; and considerable waste of material and effort. This is less true where older age groups are being taught, since they derive more help from instructional material. With college groups, the author has found that this type of general shop works out very well, while with junior-high-school groups the system is very unsatisfactory. The general woodshop, or the general metal shop, and other similarly organized shops work much better.

In order that an industrial-arts program may function well, the curriculum and teaching devices must be carefully planned. Decisions must be made concerning what should be taught, and this will be largely determined by the needs of the community, the student, and the facilities available. In

small communities the matter will be largely decided between the board of education and the principal, with details to be thrashed out between the industrial-arts teacher and his principal. But where there is a staff composed of more industrial-arts teachers, better planning can be done by the more democratic process of organizing teacher policymaking groups, encouraged by the administration to plan, decide, and carry out programs. This they can do far better than one or two individuals could. Such policymaking groups, or committees, composed of several members of such a group, can also do efficient work in originating and organizing instructional material. For example — two or three instructors teaching the same or similar subjects could divide the job of working up new designs for projects, making job sheets, working up related information sheets, and other instructional devices. Then after the work has been properly planned, thoroughly organized, it can be made available to every teacher of the group.

Instructional Methods

Instruction sheets, blueprints, tests, and many other teaching devices need to be used by the industrial-arts teacher. The question arises: "What shall the boy make?" It is very poor planning which lets every boy do what he wants to do without regard to objectives. It is just as nonsensical in industrial-arts programs as to let each individual choose for himself what he wants to choose out of an arithmetic course. Yet, many industrial-arts teachers conduct their programs on just such a day-to-day basis. The correct way to teach industrial arts is to plan the course and organize the instructional material very carefully. Beginners need to be taught basic principles, and certain basic facts and processes. Every effort should be made to plan the student's work so that he must do some planning and thinking himself, but this does not come about by haphazard methods of presentation or planning. Some choice of projects is desirable, but in the lower levels in particular, it should be a choice with limitations; one which permits variety without sacrificing essential learning processes.

A course in woodworking, for example, can be built around a number of projects which compel the learner to perform and master essential operations, and gain essential information. A number of projects, each one different from the others, but each one teaching the same lessons and skills, can be planned so that the students have some selection. Thus, dreary standardization and inflexibility is avoided, but the program has enough stability to permit methods of presentation to be planned, and materials to be made available ahead of time. Using this method the teacher is able to cut and store dimension stock before school opens or classes begin. This allows work to begin promptly. There is no waiting for something with which to start work, no loafing period which inevitably leads to discipline problems. The time saved can be used to good advantage by the teacher and the students in more teaching and learning. Planned work need not be dull, nor will it lag. Things go well for the teacher who plans ahead and provides ahead. New projects, after the first one has been completed, should present new problems, new and more difficult lessons to be learned, new techniques and skills to be mastered.

Much of the organizing ability and success of the work carried out will depend upon the type of training which the teaching staff has had. So-called practical men have often had a very difficult and trying time of it when given the opportunity to do some teaching in a public school without first having taken adequate professional training. The author knows several who have been sadly disillusioned about the willingness of boys to take to handwork as dished out by so-called practical men. Anyone who stops to consider for a single instant the difficulties experienced by anyone in teaching his own child, or a single apprentice in a factory, will realize that the proper techniques must be mastered to handle efficiently 150 pupils in a single day; often 30 or more at a time. It is no simple task, as every industrial-arts teacher well knows. Therefore, thorough professional training is essential in schools where the most modern methods, the best trade and laboratory experience, are taught.

To the average person who is not familiar with the facts, the teacher who leaves school an hour or two before factory whistles blow, seems to be having an easy time of it. Mr. Average Citizen is often unaware of the vast amount of planning and preparation carried on after or before school hours to keep the program running smoothly. Again, when this citizen sees the small number of seemingly inconsequential things made by Johnny in school industrial-arts classes, he is likely to feel that Johnny must be wasting a lot of valuable time. "If I were Johnny's teacher, I'll bet he'd bring home bigger and better things; things amounting to something," he may sigh to himself.

Judged by money values, he may be right about the product Johnny brings home. What he often fails to realize is that Johnny's product cannot be appraised from the standpoint of its commercial value. Johnny is not working in a factory and is not producing for profit. Johnny's job is learning, getting new experiences, adapting himself to ever changing life problems, finding and learning to use the "props" which he will so badly need to lean upon when he tackles life's problems on their home grounds. Johnny not only makes a paperweight in the machine shop, but during the process he is also learning something about metalurgy, about calculating, about machinery and mechanisms, and about a lot of things which do not show up in the finished product. While it should not, perhaps, be necessary to have to point out all of these things to Johnny's father; still, this being a democracy, and one in which Johnny's father helps to pay the bill, and in part shares the responsibility for not only what Johnny gets in school, but for what a lot of other Johnnies also get, it is his due to be kept informed on what is going on. How can this best be done?

The Value of Publicity

To keep him and all the other fathers, mothers, and taxpayers informed and satisfied that Johnny's time is not being wasted, and that he is, on the contrary, benefiting in the fullest measure from the means being provided, is an essential part of the school's job. In this the entire school should have a share, and the industrial-arts department in particular can play a very important part.

A regular program should be instituted for keeping the public informed on what happens to Johnny in school, and in fostering a more complete understanding between home and school. This is important to the extent that upon its success often depends the willingness of the public to support and improve the program. There should be convenient school visiting periods, well advertized in advance, during which parents have an opportunity to see the program at work. There should be exhibits and hobby fairs. These should be carefully planned and well presented, so as to give an over-all picture of what has been accomplished by the school as a whole. Such exhibits, if properly displayed, seldom fail to impress people with the importance of the work and the valuable results being accomplished. It is better to group all the work of every school department in one place, such as the floor of the school gymnasium, rather than in widely separated places, such as individual classrooms. The public can get a clearer, more integrated view of what has been accomplished, and the picture will be more impressive.

To illustrate how this has worked out for the good of one particular program; an industrial-arts teacher took a job in a certain New Jersey community where the industrial-arts program had made a very poor showing for a number of years, and where, as a result, the board of education was seriously considering dropping the program entirely. Each year the people of the community were afforded the opportunity to vote on the individual items on the school budget. The year when the new teacher took the job, the industrial-arts program received hardly enough votes to sustain it. At the end of his third year of service, his efforts resulted in such marked improvements that the industrial-arts program received the highest number of votes of any item on the school budget. Each year school exhibits were bigger, better, and more widely attended. After five years another industrial-arts shop and an extra teacher were added to the program. The public was being informed that it was getting its money's worth.

Teacher and Students Cooperate in Planning the Work

*E. H. Curry**

It should be the goal of every shop teacher to give instruction in such a way that the pupils in his class will have an opportunity to participate in planning the procedure to be followed on the projects they are going to make. The idea of having students follow a planned procedure is not new. This conception has been expressed by our leading educators for years. However, the technique to follow in order to have the pupil help with the planning of these procedures seems hard for some teachers to comprehend.

The hardship of having students work from a plan of procedure was eliminated with the development of various shop planning books. The teacher following the path of least resistance made or bought job sheets for the various projects they desire to teach and presented them to the students as the need arose. They did this by writing the procedure on the blackboard and having the pupils copy it into their notebooks. When a teacher had several classes doing the same job and plenty of blackboard space, they would leave the procedure on the board from day to day until all pupils had copied it. In some cases the instructors had their pupils copy several jobs into their notebooks before giving a single demonstration. Unfortunately, there are still plenty of teachers who prefer to give instructions by these methods.

Before a teacher should attempt to have a group of students plan a procedure for a selected project, he himself must first do a good job of planning. It is necessary because the teacher has to: (1) know what operations and related information he will cover in teaching the project; (2) know what equipment, material, and other teaching aids he will need to present the subject matter; (3) know how many operations and how much information he intends to cover from day to day; (4) anticipate the procedure the pupils will suggest in planning how a project should be built; (5) have listed various references for additional study; (6) have a test which will cover the subject matter taught. An article which appeared on page 44A of the March, 1946, issue of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine under the title of "The Teacher Plans His Work" covers this subject.

The time for the pupils and a teacher to plan the procedure for a selected job should either be prior to the demonstration or during the demonstration of the selected project. In either case the instructor should provide several finished models for the pupils to inspect. This will give them a good understanding of what materials are used and how it is constructed. If the planning is done prior to the demonstration the entire procedure for building the project should be lettered into the pupils' planning books before starting the series of demonstration. If the planning is done during the demonstration only that part which is demonstrated that day should be lettered into the planning book.

Now let us go through the routine of the teacher and pupil co-operating in planning their work. The goal toward which every teacher should work is to have all the *steps in doing a job* planned by the students. No step should be lettered into a student's planning book unless it has first been suggested and approved by the boys in the class.

The teacher, having selected a project which covers the desired operations, introduces it to the class by describing how the project is used and what the students will acquire in building and planning it. The class will then be called to enter into the planning by giving a name to the project to be built. After several boys have volunteered various names, the class should vote on them. The project will be called by the name receiving the most votes. The class is now ready to plan the procedure.

The teacher should then ask the question, "What will be the first step we will perform in making this project?" Certain boys in the class will immediately respond by raising their hands. Do not always call on these because if you do, only a select few will participate in the planning. In many cases call on one of the pupils that didn't raise his hand. Sometimes the boy called on will not care to suggest a step. You shouldn't give up, however, but stick with him until he makes a suggestion. Continue asking different pupils until the majority agree on the step to be performed. The teacher should then letter the steps on the blackboard, and the pupils should letter them into their notebooks. The instructor should very carefully demonstrate the various processes necessary in performing the step. After demonstrating the necessary operations involved in the first step, the teacher should repeat the same process in planning the second step, the third, and so on until the entire project has been planned by the class and demonstrated by the instructor.

While the demonstration is in process the instructor should get suggestions from the class as to the correct tools and the best material to be used. For example, "What saw should be used to cut this board lengthwise?" "Will you select a saw from the table and tell the class why it is the correct one?" "Why do you suggest gumwood in preference to basswood?" It is also sometimes a good idea to start the demonstration without having any tools on the demonstration bench. As the demonstration progresses have the boys go to the cabinet and select the proper tools to use. Also during the performing of an operation, call on one of the students to do it to see whether the teaching has been effective. As the tools and materials are used, the teacher should letter the names of the tools and materials on the board and have the pupils letter them into their planning books.

During the course of the demonstration, there will be certain steps which will seem to the pupil and teacher to be more important than others. At the suggestion of the class, these should be circled and a line drawn out into the margin of the planning book. The student foreman of that project will be asked to O.K. these steps as the pupils construct the project. It is also excellent foreman training to have the foreman check the work of the instructor during the demonstration. When the teacher has performed the step correctly, the foreman should initial the step that was lettered on the blackboard.

To plan and demonstrate an entire job may take several days. No more should be planned or taught in a single day than a boy can easily assimilate and actually perform in the remaining class period.

The following are suggestions that a teacher should keep in mind when helping pupils plan their work:

1. Learn the names of all your pupils so you can address them with ease. If it is hard for you to learn the names, have a seating chart to which you can refer readily.
2. A few boys should not be allowed to do all the talking. Everybody in the class should participate in the planning.
3. The teacher should not suggest a single step. Even if the pupils plan incorrectly, that plan should be followed. Subsequent planning will show the pupils where they have made their mistakes.
4. The teacher should letter the steps on the board as they are suggested by the class. The pupil should letter them into their planning books at the same time.

NOTE: All steps that have been placed on the board should be erased before the next class enters.

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Having pupils plan their work is not a cut and dried procedure but a technique that has to be developed by the individual teacher. A technique that involves laying the foundation for basic thinking, and then brings these thoughts out by well-directed questions. Mr. Bass in his *Fifty Hints for Teachers** says this about questions.

1. Put questions clearly.
2. Questions first — Ask for answers later.
3. Avoid repetition of students' answers.
4. Avoid reading to the class.
5. Avoid chorus recitations.
6. Avoid rotation in recitation.
7. Use the question as a thinking device.
8. Use questions to make pupils think.

The results of group planning are very gratifying. The pupils get into the habit of thinking through the best possible procedure in making a project. Later on when the student wants to build a project of his own choice, it is very easy for him to plan the proper procedure and do the job with very little difficulty.

*M. Reed Bass, *Fifty Hints for Teachers for Vocational Subjects*, American Technical Society, Chicago, Ill., pp 19–26.

Plastics and the Returning G.I.

*D. A. Dearle**

According to some statistics, an estimated eight million veterans will have been released from the armed services by the end of 1946. This means, in effect, that within this year a vast army of former G.I.'s will be seeking civilian jobs all over the country. A large percentage of these men will undoubtedly return to the work they left, but many millions of them are hopefully planning to enter what they feel to be jobs with a future.

The other day I received a letter from a man who has been in the service for almost four years. He is still in uniform but expects to be released shortly and inquires about getting a job. Since being in the Navy he has had an opportunity, as he puts it, "to read a whole lot and see that plastics is the coming thing." Many veterans, imbued with the same idea, are constantly asking about the possibility of getting some sort of work in the plastics field. The question naturally arises as to just what opportunities do actually exist in this highly publicized field. Is this enthusiasm justified, and if so, will there be room for all of the plastics-minded to follow their vocational choice?

Unquestionably, the plastics industry as a whole has grown by leaps and bounds during the past decade, and it is generally recognized that additional impetus was given to the use of synthetic materials as a result of the war. Statistics furnished by the United States Department of Commerce reveal that production of synthetic resins rose from 59 million pounds in 1934 to approximately 784 million pounds in 1944. While this is a gain of over 1300 per cent in 10 years, it should be kept in mind that the figures are expressed in pounds, not tons. Less spectacular, perhaps, is the expansion that has taken place in the plastic molding field. In this particular phase of the business the number of plants in operation has been doubled during the past four years. Numerous other statistical figures relating to plastics machines, presses, dies, etc., all point to tremendous unit increases over a 10-year period. With expansions such as these being made in all directions it is no wonder that the returning serviceman eyes plastics with a hopeful look. His chief concern, however, is just how and where he can start to look for that new job in the industry.

Today the plastics field is really divided into two major groups of industrial activity. In the first group are to be found the large chemical companies who manufacture the raw materials, and in the second we find the concerns who fabricate or mold these compounds into the finished plastics parts. The interested applicant, if inclined toward chemistry, should seek employment with one of the large material manufacturers. Opportunities of all kinds exist in the various departments where the compounds are made. The type of position sought would naturally depend upon the qualifications of the applicant. The veteran with a high school education, for instance, could start near the bottom by working in the rolling, mixing, or granulating room. If the beginner happened to have majored in college chemistry, however, his niche would probably be found either in the laboratory or technical sales department.

A greater diversification of opportunities exists in the plastic molding field where the raw materials are converted into finished products. Here we find room for toolmakers, draftsmen, engineers, and a host of different jobs requiring specialized knowledge. Again the applicant should consider his particular bent and seek the type of work best suited to his qualifications. For example, the G.I. who possesses little more than a grammar school education and no experience whatsoever in the plastics field would do well to start in as a compression or injection molder. The technical graduate, on the other hand, should seek a position on the drafting board or perhaps in the estimating department. Sales engineering also offers interesting opportunities to the graduate engineer. If the G.I. happened to be a toolmaker before entering the service he should attempt to follow this trade by seeking a position with a firm which specializes in the construction of plastics molds.

Regardless of the particular phase of plastics selected, or the amount of education possessed, the job seeker should devote his spare time to outside study. The tyro who is earnest in his intentions of getting ahead in the plastics industry should make every effort to combine his practical experience with theoretical knowledge. This can very easily be accomplished by reading books on the subject, or better yet, by joining a class where all phases of the business are presented. Most of the evening courses in industrial plastics are conducted by instructors who are actually engaged in the industry during the day. Thus the student is afforded the opportunity of gaining an intimate knowledge of all details.

In spite of its rapid growth, the plastics industry is still not large enough to absorb all of those who aspire to responsible positions in one or another of its branches. Naturally, the number of positions tends to diminish as the top is approached, but as is true in any business, the key positions have to be filled from the lower ranks. Successful advancement will go to those who possess the courage, not only to work in the industry, but also to follow up their working hours with diligent study.

The returning G.I. who wishes to get any type of a job in the industry will find much helpful information at his public library. Among other things, he should be able to obtain there the latest volume of the *Encyclopedia of Plastics*. This large book is published annually and in the appendix appear not only the names and addresses, but also the personnel of all the plastics material manufacturers. In addition, this plastics catalogue includes the names of all the custom molders and extruders for the entire industry. From a list of nearly five hundred companies the job seeker can select the names of concerns in his particular locality and either contact personally, or write to as many as he wishes in an attempt to obtain a position.

As previously pointed out, there is a great future ahead for plastics, but for those G.I.'s who engender thoughts of getting into this field, competition will be keen and advancement slow. To start on the bottom rung of the ladder means that a well-planned course of action must be taken. In other words, this means going out and looking for the job at the earliest possible moment. An endeavor of this nature, if pursued with diligence, is bound to result in ultimate success.

*New Britain, Conn.

Supervision in Vocational Education

*H. Boodish**

Any program of supervision to be effective must grow out of a sound philosophy of education. Supervision is nothing more than a tool for the implementation of that philosophy. In developing such a tool in a vocational school, the first step, therefore, is the formulation of an educational philosophy of vocational education.

In this country, vocational education is a phase of secondary education. Yet, in origin, the vocational school represents a revolt from the traditional high school. Until the passage of the Smith-Hughes act in 1918, secondary education in the United States was symbolized in the four-year high school whose chief function, at least as manifested in its curricula offerings, was preparing young people for college. This philosophy was in the main a continuation of long years of practice, during which only the sons of the more well-to-do families went to high school, primarily for the purpose of preparing for one of the professions.

The Harvard Committee in its report on "General Education in a Free Society" characterizes this state of affairs as follows:

"... in 1870 three fourths of those who attended high school went on to college. The high school's function was therefore clear; it was simply to prepare for college. Its curriculum, membership, and general atmosphere were all dominated by that purpose. Those who went to high school were therefore a fairly homogeneous group, on the whole children of well-to-do families looking forward to the learned professions or leadership in politics or trade. If included among them were doubtless a certain proportion of children of poorer families, still these cherished the same ambitions, probably all the more intensely. They were the proverbially ambitious boys, eager to rise in the world and no doubt destined in most cases to do so. No one was compelled to stay in high school and if you could not stand the pace, you fell out. The result was that the curriculum, if narrow and rigid by modern standards, was compact, testing, and absolutely clear in its intention ..." (pp. 7–8).

Philosophy of Education in 1870

This philosophy of education served well the purposes of society of the kind that characterized life in the 1870's. However, society never stands still. In the case of our country, the 1870's marked the beginning of a new era. The Civil War had just been completed, and even though the wounds were still fresh, the country was none the less united as far as the future was concerned. Sectional differences, though still smoldering beneath the surface, were finally disposed of. The Industrial Revolution, which was in part interrupted by the Civil War, resumed its course, but with more intensity. Railroads linking the East and the West and the South and the North sprang up almost overnight. Big business and its offspring, large scale production, first began to make its appearance. The country, in short, was changing from an agricultural-rural type of society to an industrial-urban society. But the changes were not only in the field of industry and economics. Politics and government, naturally, also underwent some alteration. The concept of democracy that worked well in the beginning years of our republic came under attack, especially with the rise of labor unions, such as the Knights of Labor, the Industrial Workers of the World, the American Federation of Labor; and the infiltration of "radical" ideas of government. Individualism and freedom of enterprise, though still the core of the thinking of the average American began to be interpreted in the light of existing conditions. "How can," people began to ask, "individualism, freedom of enterprise, democracy, be maintained in the face of pools and trusts and corruption in government?" As a result, there grew the demand, as voiced by the "Populists" and later by the muckrakers, for widening the base of democratic control — of extending the franchise, of popular election of senators, and of government regulation and control of public utilities. The demand for extending educational opportunities to more and more people was a natural corollary — for how could any person fulfill his function as a citizen of a democracy without being schooled in the ways of democracy? As a result, along with the political and economic changes that followed the close of the Civil War, states began to pass laws not only extending educational opportunities to all youth, but to make it mandatory for young people to attend school until the ages of 14, 16, and even 18. Thus, while in 1870, the enrollment in secondary schools was 80,000, it had risen to 7,000,000 in 1940.

While these changes were going on, and while the secondary school enrollment was increasing by the thousands, secondary education in the main continued to be governed by past practices and traditions. The high school remained primarily the institution that was to prepare young people for college and the professions. Yet even education, in some respects, at least in the past, one of the most conservative of the institutions of society, had to give way to the changing needs of the people whom it served. Following the end of World War I, a commission appointed by the Federal Government formulated a set of principles as a basis for a philosophy of secondary education in a democracy. The now well-known seven objectives, the *Cardinal Principles of Education* gave emphasis to the need of training the individual in seven different fields — worthy home membership, vocation, health, command of fundamental processes, proper use of leisure time, citizenship and ethical character. Although the high school became cognizant of the new philosophy of education and began to change its offerings in line with these objectives, in the main the high school still ministered to the needs of the traditional academic student.

As a result, in spite of compulsory school attendance laws, educators saw that there were millions of young people who either did not go to high school, or who dropped out before they were graduated. Obviously, it was recognized that the reason for this was not only the fact that the traditional high school education did not fulfill the needs of these young people. It was recognized that economic factors as well as social and home conditions played a significant role in the failure of young people to continue their education until a given age was reached. Yet, among many educators, the need for a revision of the curricula offerings, more in line with the needs of our industrial society, became apparent. The passage of the Smith-Hughes act in 1918 gave recognition to this demand.

The Passage of the Smith-Hughes Act

Thus, as was stated previously, the vocational school, in origin, represents a revolt against the traditional concept of secondary education. In many respects, this view is unfortunate, for it tended to divide secondary education into two branches: one, represented by the high school, being primarily concerned with giving young people a *liberal education*, with the latter being interpreted to include training in the classics, preparation for college, and if stretched, training in general living; the second, represented by the vocational school, being principally concerned in training the individual in a given trade or occupation, and if stretched, some training in general living. At the beginning, such an interpretation was perhaps inevitable, for throughout the history of formulized education the nonacademic person has been regarded as inferior to the academically trained person. It seems, that society has always regarded the white

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collar worker as being socially on a higher plane than the fellow who worked with his sleeves rolled up. The reason for that we know is partly economic and partly social. In the past only royalty and the well-to-do classes could afford to give their sons an education. Education, academic education, then became to be associated with superiority. Even today, with our highly democratic philosophy of life, there is still a strong tendency to regard the educated man as being better and superior to the noneducated person. We have, for example, the spectacle in our country of white collar workers earning considerably less than mechanics, but who would not consider changing their type of work (even if they could) because our society persists in holding the concept that the manual worker holds an inferior social position than does the white collar worker. Economics, labor unions, and the cost of living is slowly changing that concept, but it still persists.

In 1918, the social gap between the academic and nonacademic person was still greater. The nonacademic rightly resented this distinction. It is a recognized psychological pattern in human behavior for one placed in an inferior position to resent those persons who prevent him from raising himself, at least, to equal standing with those above him. This reaction on the part of the nonacademic person was all the more strengthened because, it must be confessed, many persons with an academic background were not and still are not without an air of snobbishness about them. We still have the tendency to regard the person with a college degree as being superior (because of the college degree) to a person without such a degree.

Consequently, when in 1918, the Smith-Hughes act was passed, this resentment against the superiority complex of the academically trained person manifested itself in almost altogether eliminating him from the field of vocational education. The resentment was so strong, that even the textbook — the traditional tool of the academic high school — was practically thrown out of the classroom. Of course, this was in part also a natural reaction to the so-called "textbook method of teaching" in the academic high school, but it was more than that. As thus conceived, the vocational school was to be a complete departure from the type of education as conceived by the academic-minded educator. The student was to be trained for a vocation. What need was there of textbooks, or for that matter of an academically trained teacher? The only thing necessary was a person who was experienced in the particular trade or occupation he was going to teach plus a short period of training in educational psychology and in methods of teaching. As a result, all teachers of shop as well as related subjects were required to have a specified number of years of experience in industry. The academically trained person could still obtain a teaching position in the vocational school in those subjects designated as general (English, music, health and social studies in some cases), but in all other subjects (shop, mathematics, science, English, and social studies where they were considered as being *related*) the academically trained person could obtain a teaching position only if he had in addition to his academic training a minimum number of years of experience (changed from six to two years in some states) in industry. Above the position of teacher, such as co-ordinator, director, principal, and supervisor, the academic person was almost completely left out, because very few initially academically trained persons had the requisite number of years of industrial experience. This state of affairs for the most part is still in existence.

The Effect of the Smith-Hughes Act

Twenty-eight years have now elapsed since the passage of the Smith-Hughes act. We have had during this time one minor and one major depression. We have also had another world war from which we are just beginning to recover. During this time it was natural for new philosophies of education to emerge. The seven objectives of the Cardinal Principles of Education enumerated at the end of World War I, however, have not undergone much change. We may use new words to express our philosophy, but basically, the purpose of education is still regarded as being principally the development of individuals — socially, vocationally, and personally. However, the application of any philosophy involving human relationships presents many more obstacles of a practical nature than the mere theoretical formulation of the philosophy. This holds true in all spheres of human interreactions whether they be in the field of government, industry, or education. Thus, in the field of government, for example, no philosophy has been more acceptable and ideally more desirable to all men than that of democracy, yet the application of democracy as a way of life is constantly beset with pitfalls, mostly due to the fact that in practice there exist conditions not visible to the theorist. Yet, those of us who are "sold" on democracy, need not despair, for if we are practical and realistic in our thinking, we recognize that at no time can the actual equal the ideal. Heaven on earth is a desirable goal to work for, but few of us can be so visionary as to expect the two ever to merge. In reconciling the failure to gap the distance between the two, the best that we can hope and wish for is constantly to shorten the distance. As in mathematics, we can only come nearer and nearer to infinity, but never actually reach it — however small the distance separating us from it.

In the field of education, no less nor more than in the field of government, the ideal and the actual represent a variable approaching a constant. It is all the more so in education because at no time has education been more than a reflection of man's philosophies in all his other walks of life. Yet, education must be regarded more than a guardian of the status quo. It is true, that by its very nature and purpose, education is partly that, but in the ideal, education has another purpose — and that is to assist man in formulating still better philosophies of life and to stimulate and foster in the growing citizen the wish and desire to live up to them.

This philosophy of education must hold true not only of the traditional high schools, but of all secondary schools, including the vocational school. It is partly with this philosophy in mind that the Education Policies Commission published its volume *Education for All American Youth*. It is also with this philosophy in mind that the Harvard Committee published the volume *General Education in a Free Society*. In a broad sense all education, from primitive times to the present, is in large measure vocational. But competency in one's chosen field of work is only one aspect of one's life. Even the pure scientist, now that we have the atomic bomb, recognizes that one cannot merely give himself to science without being at the same time concerned with the world that makes practical use of his pure science. Training for an occupation is thus only one aspect of education. By far the major portion of education must be its concern with life in its entirety. "Education," John Dewey stated some time ago, "is life." Living includes more than just earning a living.

This does not mean, of course, that the vocational school must retrace its step and adopt the philosophy of the traditional high school. As a matter of fact, the traditional high school is slowly realizing that it must change its philosophy and adopt one more in line with the needs of our present-day society. In other words, both the high school and the vocational school, in the face of the needs of a democratic society, must merge, at least in philosophy, into one institution, since all secondary education should train neither for a vocation exclusively, nor for college exclusively. Secondary education broadly conceived, and as it grows out of the needs of our youth and of our society, must educate people for living effectively in a democratic society. This means training not only for an occupation (whether it be manual or white collar) but training in how to function as an effective citizen, in how to get along with other people, in maintaining well-adjusted mental relationships, and in making self-satisfying use of leisure time and finally, in effective participation in citizenship, local, national, and world.

To do this we must bridge the present gap between the vocational school and the high school. We must bridge the gap between the academic minded and the nonacademic-minded person. Ours, at least in the ideal, is a classless society. The only value we must attach to work is that it

is productive and socially useful. Our educators must be persons professionally trained, with *professional* including both practical and academic training, with the two components varying on the basis of the duties demanded of the position.

Supervision in Vocational Education

This leads indirectly to a consideration of the main thesis of this paper: Supervision in vocational education. As it has developed in the past few years, supervision is a phase of the entire educational program. In the broadest sense, supervision is related to the objectives which the educative process is designed to achieve. Thus supervision becomes in a sense a method, or a tool for implementing the best possible teaching-training situation. But here again we have a philosophy that sometimes defies practical application.

In the past and to some extent today, supervision was interpreted according to its literal meaning. The supervisor was a person in a position of superior authority whose task was to inspect, to criticize, find fault and correct the activity of the person in a position of inferior authority — the teacher. That concept of supervision, at least in education is being slowly discarded. Instead, supervision is coming to be regarded as a special type of leadership. It doesn't necessarily nullify the line-staff relationship between the supervisor and teacher. It merely alters the nature of this relationship — substituting for authority as the implementer of better teaching, leadership, understanding, greater resourcefulness, superior training, a genuine interest to improve, and a spirit of co-operativeness.

Obviously, if that is a desirable concept of supervision, it must apply to all secondary schools, the high school as well as the vocational school. We have seen in the history of our country — in all spheres of human relationship, that leadership, resourcefulness, competency, understanding, and the ability to organize and to get individuals to work co-operatively in group enterprises comes not only from either a purely academic training or a purely industrial training. The presidency of the United States is ample witness to this fact. We have had men like Jefferson and Jackson, Lincoln and Roosevelt, as evidence that emphasis on any particular phase of training is not the only criterion for success as a leader of men. The field of industry and labor are further illustrations. Some of the most outstanding industrial executives and labor leaders can boast of little formal academic training. In the face of this evidence in all walks of life, is the field of education an exception? Obviously, the answer is no. Yet education in the United States is still characterized by a feud between the academic and nonacademic leaders. In the case of the traditional high school, the leaders look down upon the vocational educators, and in the case of the vocational school, the leaders want little to do with anything that smacks of the academic. However, this observation probably is correct, namely, that the leaders of the vocational school of thought would be perhaps willing to extend a welcome hand to the academic educator, if the same welcome would be reciprocated by the latter.

But where does all this leave the children in our vocational schools? Let us, for example, look at the matter of the program of studies. There is still no unanimity on the question of what constitutes related subjects. As a result, the nonacademic offerings in any vocational school may be either the traditional academic subjects, called related subjects, or they may be anything else which the teacher wants to teach. Of course, here is where the job of the supervisor assumes significance. But as presently constituted, the function of the supervisory staff of a vocational school is somewhat one sided. In the traditional high school, as we know, there is in addition to the principal and assistant principal who act both as administrators and as supervisors, heads of departments whose task it is to co-ordinate and supervise the particular area of subject matter, such as English, social studies, and languages. In the vocational school, the position corresponding to the head of department in line-staff relationship is the co-ordinator. His function is to supervise and co-ordinate a family of trades and vocations. In other words, his sphere of work is supervision of the shop courses — co-ordinating the training of the pupil with the demands of industry. But, in the field of academic or general and related subjects there is no recognized supervisory position. In some schools, the task may fall upon a co-ordinator, in others, it becomes one of many duties of an assistant principal or of the principal himself. There is nothing theoretically wrong in such a division and delegation of supervisory duties except that in philosophy, and as it works out in practice, it goes contrary to one of the basic principles of supervision, namely that good supervision will attempt to make use of the best talent available (regardless of whether the talent has an academic or industrial background).

Principles of a Supervisory Program

Perhaps, at this point a statement of the principles of a sound supervisory program is in order. The following set of principles, gathered from current literature may well apply to any type of school whether it be a vocational or a high school:

1. Supervision should elicit the co-operative effort and varying abilities of the entire school staff — and at times even the efforts of the student body.

2. Supervision should recognize the limitations of its staff and employ experts and specialists when their services would be of value with the person placed in a supervisory position functioning as a resource person.

3. Whenever possible, initiative in planning activities should come from the individual who shall be mainly concerned with carrying them out. The supervisor should be in a position to suggest and offer guidance.

4. A spirit of personal growth should pervade the atmosphere of everyone's activity.

5. The primary purpose of supervision should be the improvement of the pupil through making possible the betterment of the teaching-learning situation.

6. Supervision should at all times attempt to utilize the special abilities of the teacher.

7. Outcomes and objectives should be definitely stated and the teacher held responsible for those that fall in his sphere.

8. Supervision should never be static. It must continually study its techniques and be flexible to meet the differing needs — dependent upon the school, the teachers, and the pupils.

9. Division of responsibility and work should as much as possible strive for economy of effort and elimination of overlapping functions.

10. Due recognition should be given to those making outstanding contributions, where such recognition will stimulate further efforts to the improvement of the educational program of the school.

Having a philosophy of education and a set of principles of supervision, the next step then is the formulation of a program of supervision. Although the responsibility for planning the program of supervision rests in the hands of the chief supervisor of the school, the principal, current educational philosophy is of the opinion that it should as much as possible be a co-operative enterprise, utilizing assistant principals, co-ordinators, and representative teachers. The following might be some of the salient points to be adhered to in the formulation of a philosophy of supervision.

The Philosophy of Supervision

1. The formulation of a philosophy of supervision. This naturally would grow out of the philosophy of education to which the school dedicated itself. However, the resultant philosophy of supervision should as much as possible be the product of group thinking — involving full staff meetings held for that purpose. Special committees made up of supervisors (heads of departments or co-ordinators) and teachers might be utilized to make special studies on current practices in supervision, and to report back their findings to the staff as a whole. The final product should have the approval of at least the majority of the staff.

2. The analysis of the weaknesses of the existing supervisory procedures. Criticism cannot often be divorced from personality factors, yet, if progress is to be made, such analysis and criticism should be a continuous phase of any program of supervision.

3. Analysis of existing weaknesses in the educational program (both in material offerings and techniques in teaching), which the program of supervision should attempt to correct. In other words, the supervisory program must be based on a set of objectives developed out of existing pupil-teacher needs.

4. Determination of what persons within the school, and what persons and agencies outside the school may be utilized in helping to carry forward the program of supervision.

Techniques in Supervision

If we accept the now current concept of supervision, namely: that its main function is to improve the teaching-learning situation and thereby help realize the principal objectives of secondary education — the four points just listed assume a significance which they otherwise might not. Supervision becomes no longer a practice in education important for its own sake, but important only to the degree to which it serves the main function of education. The techniques of supervision should then also come in for scrutiny and analysis. Visiting or inspection, although still a function of supervision, must lose their previous connotations, that of mere fault-finding, and assume a more wholesome purpose, that of working out with the teacher ways and means of correcting any existing faults. In addition such other techniques or procedures in supervision must be added as:

1. Periodic evaluation of the results of instruction through the use of the survey method and of appropriate tests.

2. Periodic evaluation of curricular offerings in terms of changing social and pupil needs.

3. Continuous evaluation of teaching techniques and research in new teaching aids such as the use of films, radio, field trips.

4. Provision for interclass and interschool visitation and provision for observing demonstrations of new teaching plans and aids.

5. Provision of opportunity for individual conferences between the supervisor and the teacher as well as provision for group meetings of a departmental nature and whole faculty meetings.

6. The maintenance of a constantly replenished professional library.

7. The provision of opportunity for teachers to initiate and to experiment with new curricular offerings and new teaching techniques.

8. The provision of opportunity for all staff members to make use of such other persons and agencies connected with the education of the pupil as consultants, advisers, psychiatrists, specialists in remedial reading, and social case workers.

9. The issuance of a handbook and periodic bulletins to acquaint both the faculty and the students of school rules and regulations, and of other pertinent information regarding the school's operation.

Fields Requiring Supervision

The fields in vocational education with which supervision concerns itself must naturally grow out of existing needs. These embrace three areas of education: (1) instruction; (2) program of studies; (3) testing.

Instruction

It is no longer true that he who cannot do anything else becomes a teacher. Teaching is becoming a profession. Good teaching is an art, which like any other art, practical or fine, demands a sincere love for the work, an interest in children, and a number of years of training in general and professional education, and special training in the field in which one is going to teach. However, although the tendency is toward more and better preparation, the teaching profession still suffers from the inertia of past traditions — that anyone can teach. The recent war emergency created a vast shortage of teachers. To meet this emergency, many school districts forgot all about preparation and prerequisities for certification and hired practically anyone with college training as a teacher. Without questioning the ability of these people so hired, the fact remains that the lowering of professional requirements — whatever the reasons — are detrimental not only to teaching as a profession, but to the causes of education itself. It seems that we humans are by nature shortsighted. We would hardly ever sanction licensing a physician without proper preparation and training because the relationship between bodily or mental illness to competency on the part of the physician is readily seen. But when it comes to relationships that are not as obviously discernible — as, for instance, the relationship of teacher competency to pupil growth and development — we become somewhat blinded. And yet, in the long run, the work of the teacher is just as, and perhaps even more, important than the work of any other profession.

But mere preparation and certification, just as mere preparation and licensing in the case of a lawyer or physician, is not the only requisite to proficiency on the job. Good teaching requires continuous self-evaluation and constant study of teaching techniques in the face of changing curricular offerings and changing pupil needs. It is in this phase of instruction that supervision can be of greatest service. The teacher must, in addition to stimulation arising from his own desire to grow and develop on the job, receive constructive stimulation from the program of supervision, in the form of leadership, guidance and help when the need arises. Obviously, there are many other factors that affect good teaching. With some of these the supervisor may be just as helpless to change them as the teacher (as for example, teacher salaries). But with all others, that are directly or indirectly related to instruction, such as, teacher load, disciplinary problems, size of classes, curricular offerings, and program of activities, supervision is directly concerned. Here again, the concept of supervision requires co-operative efforts of all staff members, constant research, experimentation, and the other techniques of co-operative supervision previously mentioned.

Program of Studies

Human beings seem by nature to resist change. It is easier to do things as they have been done in the past than to suddenly make an about-face and do something that is new and different. Yet progress demands that we sometimes must cast away our old habits, our old beliefs and traditions, if they no longer serve our best interests, and adopt new beliefs and new ways of doing things. Not infrequently has this been accomplished without a struggle, whether it be in the field of government, industry, or education. We have already seen that our schools, by the very nature of their function, are in the main conservative institutions — preservers of the status quo. In the past this began to undergo change only when conditions about them had so altered that not to change would mean the failure to maintain the status quo (a new one to be sure). We now recognize that one of the most important functions of supervision (as well as of administration) is to continuously evaluate and revise the program of studies in light of changing social and individual needs.

However, for such evaluation and revision to be effective it must not merely come from those placed in authority, but should come from the co-operative efforts of all personnel connected with the educational program. One of the chief criticisms in the past against the introduction of new courses of study, for example, was that it did not always have the support of the teachers who were going to teach them. The same holds true for new activity programs, such as clubs, student associations, home room, and so-called extracurricular activities when they have been introduced without securing beforehand the co-operative planning of teachers. If the school is going to be an institution dedicated to the promotion of growth and development of its pupils, it must also provide for the self-growth and development of its staff. Both aims can best be achieved through a program of supervision that gives the teacher and other personnel members an opportunity to initiate new experiments and to plan and work co-operatively in making desirable changes in the program of studies. It is part of human nature to give one's best to what one believes to be part of his own creation. Supervision, to be successful, and to serve most effectively in putting across changes in the educational program must be able to make each person connected with the educational program feel that he or she has contributed his or her share, however small, in the formulation of that program. In addition (and this holds true in all secondary education and particularly so in vocational education), the planning and development

of an educational program, at least as far as the basic philosophy and objectives are concerned, should include the help and guidance of the community at large — through representative members of such groups as industry, labor, the church, consumer groups, agencies of government, youth and social welfare groups.

Testing Program

Testing the results of instruction of any given area of learning is only one phase of the testing program. Another, perhaps more important, is testing the results of the entire educational program in terms of its major objectives. The latter, obviously, is the more difficult of the two, because it involves the measurement of such qualities as habits, attitudes, appreciation, outlooks, and power of judgment, which do not lend themselves easily to being tested. Few schools attempt a testing program of the latter type, because of this difficulty. Yet, the need for evolving satisfactory testing techniques in this field is becoming ever more pressing. The initial consternation with which the public, legislators, and some educators met the now famous American history test given to certain college freshmen and publicized by the *New York Times* has by now subsided. Perhaps the most important result of this enterprise was that it helped to turn people's minds not only to the need of perhaps revising our courses in American history in secondary schools, but to the need of revising both the objectives desired of such a course and to the devising of new testing techniques for measuring these objectives. After all, if part of the job of the secondary school, whether it be a high school or a vocational school, is to train the student in citizenship, in appreciation of the democratic ideal, and in the development of attitudes in human relationships necessary to democratic life, of what importance are isolated facts such as the terms of the Missouri Compromise or who founded the Colony at Connecticut? Is it not more important to instill in the growing mind an understanding of the conditions that made people come to this country, an appreciation of the basic human struggles for political and economic freedom, and a desire to emulate the spirit of the men who pioneered in these struggles? It is true that a knowledge of certain facts and events are important in obtaining a proper understanding of the period of history studied, but is the mere testing of knowledge of these facts an indication that the student has acquired the by-products — the appreciations and the attitudes? On more than one occasion, the writer has asked a class to write a composition on what constitutes good citizenship in the class, in school, and in the community. Invariably, even the most flagrant offender of good citizenship produced a composition that gave ample evidence that he knew and understood what qualities make for good citizenship. As a matter of fact, take any adult criminal or the most outstanding juvenile delinquent, and he will be able to tell you what is wrong with his behavior and what he should do to correct it. Obviously, then, the mere knowledge of facts is not a guarantee of one's using them constructively.

We have long accepted the thesis that the mere teaching of facts does not constitute an education. We must also teach skills, we must foster the growth of acceptable attitudes, we must inculcate desirable habits of thinking and acting. The planning of courses of study and methods of teaching are obviously important. But we must also check and make sure that the results are what we want them to be. This requires a program of effective testing and measurement. We know that psychologists and educators have been working in this field. The results are promising, but still more experimentation and research is necessary. Here again, the work of the teacher, through a program of co-operative supervision can be of great service. The school as a whole must be made conscious of the need to continuously study and revise its testing program. Group discussions, committee investigations, interschool visitation, and a continuous survey of employer and community reaction to school graduates, may well be a part of such a supervisory program. The results yielded could be used not only for the purpose of studying and revising existing testing techniques, but also for studying and revising the curricular offerings of the school.

Supervision of School Personnel

To the American people the caste system is obnoxious whether it is in the army or in any other field of human relationship. The American people respect authority and superior ability, but they do not like differences in treatment of individuals that are justified only on the basis of difference in rank or authority. That spirit exists also in education. Even among pupils, there is the growing tendency to regard the teacher primarily as a person superior in position and to be respected for that, but not superior as an individual. Frequently, however, persons of higher rank, carry over their feeling of superiority in their personal relations with those in an inferior position. That perhaps, more than any other factor, is responsible for the resentment which the teacher feels toward a supervisor. Co-operative supervision obviously is opposed to such relationships, which unfortunately did characterize educational supervision in the past. The effective supervisor, as we indicated previously, is the one who does not effect change through issuing orders, but who, because of his superior training and leadership, is able to stimulate those under him to want to initiate changes, because they feel that they themselves want the change.

It is to be assumed that the selective processes used in securing the different members of the faculty of any given secondary school should aim at selecting only such persons as are best qualified for the duties they are to perform. In the case of vocational schools, as we have already pointed out, the error is made limiting the selection of the supervisory staff mainly to persons with a specified number of years of industrial experience. In those areas of vocational education related with the shop-work phase of education, such limitation may be understandable. But there are other areas in the program of vocational education, those phases concerned with the broader objectives of education — those core objectives that apply to any program of secondary education — that the limitation of the selection of supervisory personnel to those having industrial experience may hinder the progress of vocational education. For such a practice narrows the field of selection by excluding talented and capable *academically* trained persons, who might otherwise be attracted to vocatjonal education.

In general, the broad qualifications of staff members connected with supervisory duties, whether in a high school or vocational school, should include at least the following:

1. Broad general or cultural education. This does not mean necessarily training in the classics, but more that type of education which yields to the individual an understanding of the environment in which he lives and of the various forces that are constantly shaping his environment.
2. A consuming interest in young people and in their improvement, but not of the reformer type. It would include the type of interest that characterized a Y.M.C.A. or scout master worker — an understanding of human nature — youth interests and the psychology of adolescence.
3. Leadership qualities.
4. Professional preparation in the field of work assigned.

Obviously, no one method of selection can be applicable to all schools. Such factors as size of the school, the number of teachers and other personnel members assigned to the school, the number of pupils, the provision for advisory and auxiliary assistance, and the interest taken by community agencies are all to be considered. However, the basic philosophy, regarding supervision, involving a maximum degree of co-operation and maximum utilization of the abilities of all personnel members, can be an ideal worth considering.

SOMETHING TO THINK ABOUT

The following news notes are taken from *Safety News* published by the National Safety Council.

In 1944, 4300 farm workers were killed on the job, and 4300 farm residents were killed in motor vehicle accidents.

Whether you own a car or not, the motor vehicle accident problem affects you. During 1945, two out of five motor vehicle fatalities were pedestrians.

Forty-three per cent of all injuries in school buildings were to children in the seventh to the ninth grades, although these children make up only 24 per cent of the total enrollment.

A Shop Teacher Takes Inventory

*Stanley H. Woodburn**

It is with awe that I realize that two decades have slipped by since I stood before my first class. Teaching was probably the last thing on my list of vocations. I got into it by accident. It was to be a stopgap, a temporary expedient between jobs. After the first ten years I decided to make it permanent. About five thousand boys have come under my influence and I pause to wonder just what that influence could have been. They have taught me much.

When starting to teach, we either consciously or otherwise imitate those who have taught us. We invariably will take for a model the teacher who has influenced us the most. If we bring a sincerity of purpose to the task, our model will not be the *easy teacher*. One short year away from school and we all know the teachers who did a teaching job and those who merely passed the time with us, albeit a pleasant one. It is hard to fool children. So everyone who enters this profession starts with certain preconceived ideals, methods, and standards. The sharpness of this blueprint is very precarious. All too frequently it fades, becomes blurred with erasures and corrections as we struggle with the jargon of the educational world. We finally realize that professional growth is the development of a point of view rather than the assimilation of a new nomenclature.

From the time when the school expanded to two logs instead of one and had a pupil at each end, teachers have tabbed two kinds of students — the very good and the very bad. I decided to concentrate on the lad who was neither — the unknown pupil. But, in a way we do know him. He never carries the ball, he sits in the grandstand. The number one seat in the classroom is not his, nor is the last one. He asks no questions, but accepts what instruction is given and generally muddles through. Neither the principal nor the office staff knows him — he is just a card in the general files. Certainly we all know him, but we just can't think of his name. The warm glow of appreciation in the eyes of the middle lad when I have acknowledged him as a personality has been a rich reward.

I do not contend for the *all-pals-together* attitude. The teacher's desk is symbolic of the line which separates the schoolmaster from his pupils. They deride the adult who attempts to be one of them. To be "professionally familiar, but socially distant" is wise counsel and a safe course. No formulas have been devised whereby a teacher can foretell the reactions of boys of high school age. As has been previously intimated, they too sit in judgment and the teacher must win his spurs. Professional rating schemes have a place in the educational setup, but in the final analysis have little to do with success or failure in the classroom. No school official can be so severely critical of the teacher as his pupils. The record is full of instances where they have staked their judgment against school boards in support of teachers and superintendents. They rate the teacher by his words, deeds, his bearing, dress, his technical equipment, and above all, by his humanism. The boy scale of values is pitched in nuances, the delicacy of which must be sensed intuitively rather than detected. This was brought home to me unforgettably several Christmases ago. My record section had presented me with a silk (I think) necktie and boutonniere to match. The color was one of those shades of wine-purple, as the boys said — *rich*. So rich indeed, that for at least a month I could not bring myself to wear it. One morning, in a spirit of recklessness, I put it on. As I entered the classroom, murmers passed about: "Look it's *our tie*. He has on *our tie*." And it is indeed, *our tie*.

Many professional problems are of our own choosing. Seeking to remedy some particular professional ill, we, through failure to think the situation through, develop a host of other irritating symptoms. Sometimes this tendency is limited to a particular classroom and teacher, or in its most violent form, sweeps through the nation's educational system heralded with slogans, catch phrases and pseudo philosophy. Vocational education is threatened with such an epidemic. Already it has been inoculated with the virus of the academic mind.

This virus, while it seems to be nonfilterable, is nonetheless very real. Briefly, it might be described as the end product of a succession of mental abnormalities. The victim in the final stages suffers from extreme flatus and a feverish desire to capture all human endeavors in stilted prose and encase them between the covers of a book. If this penchant for wordy superorganization stopped at this point, a remedy might be found, but it extends *ad infinitum*, *ad nauseum*. The victims call back and forth to each other in a weird kind of mumbo-jumbo, a sort of Coueism as they seek various substitutes for competency.

We know that the children cannot write, so we rig out carefully prepared papers and distribute them to our classes. This procedure is rationalized as "saving of pupils' time." The pupil has had so much of his time conserved so that he can participate in this and that activity, drive or whatnot, that to our surprise and chargin, we find that he has not had time to learn to read. His world of literature is encompassed with pictorials. We feed him assignments in which he plays little games of supplying monomial answers to carefully prepared statements. Need we be surprised when he arrives at the exit door of high school with meager vocabulary and a naïve disregard for the laws of syntax?

The academic mind condemned the manual training techniques as the teaching of processes at a time too far removed from the need to use them. So we abandoned *exercise work*. Why learn to swim until one falls overboard? Why prepare for war until we are attacked? Why learn to write, when notes are handed out by the bale? I have not yet seen a job sheet on how to drive a nail, but I expect to. Why learn to read, one picture tells more, etc. By eliminating the needs we can eliminate most of the educational process which has achievement as a goal and develop a people whose mind will be the ideal clean slate — a perfect blank. We realized that a lad might never be required to scarf together two timbers, to lace a belt, to cut a miter by hand, to carve a filet, to file two pieces to a fit. He and we must wait until the need arises.

We cooked up a set of needs and pulled the *project method* out of the pot. The academic mind liked this one and seized upon it and presto — the project method swept the country. We, in the school shops, found out how much skill and how much precision can be acquired on the job. Our scrap piles told the story. Practically half of a generation survived the project method.

Education for *leisure time* became a definite goal. So definite in fact, that other education was laid aside to make room for it. Half of another generation grew up unable to handle decimals beyond two places, and slightly confused as to whether Martha Washington was a candy or a sewing cabinet. But it had splendid hobbies.

The academic mind envisioned the school children of America laboring with the overlapping facts of history and in a tender moment adjusted those facts by the simple expedient of ignoring them. In social studies our children live in the ever present *now*, and make the same mistakes which history recorded as having been made 2000 years ago.

The academic mind considered *pupil interest* as a paramount issue. Progressive education has resulted. The only difficulty is a minor one — progressive education fails to progress. Some, who are unkind, add that it also fails to educate. Every trade has its monotonous, uninteresting, mean tasks. Perhaps we should not teach them, because nobody likes to do them. Our grandparents underwent many hardships to acquire the tools of knowledge. Father had the learning of his younger years seasoned with the cane and the rule.

*Drexel Hill, Pa.

But some indomitable force made him return for more. (And it was not always grandfather!) Whence came this desire to excel, to achieve and not just get by? Interest, of course. He may have missed the finer shades of the social aspects but his driving interest was in self-improvement. That was his concept of an American citizen. It has been many years since I have seen a class in any subject have a norm of achievement above seventy per cent. If father made less than eighty he was considered a failure. Have modern methods, under the aegis of the academic mind produced as fine a learning?

Vocational education offers to the academic mind a way of salvation from its sins. Three types of children are misdirected to the vocational school. They represent the typical failures of modern methods. First, the youngster who is lost in the maze of activity. Bewilderment has claimed him. He could not adjust himself rapidly enough to the ever changing educational scene. He is told that he is not "adaptable" and had better learn a trade. The poor kid would be happy to stick long enough in one spot to learn anything. He is the lost explorer of exploratory courses.

Second, there is the antithesis of the first, i.e., the pupil who has caught on to the educational stunts too well. He is no moron, even though the little card shows a notch above failure. He has learned to do nothing, learn nothing, keep within the legal attendance fringe, and be advanced anyway. He is the victim of high promotion rates.

Some cases involving both of these types are successfully straightened out in vocational schools, to the continued wonder of all concerned — except the academic mind. Nothing can disturb its role of *supreme diagnostician.*

The last type with which the vocational teacher is inflicted is the pupil who has made an unwise choice of grandparents. The academic mind can see nothing incongruous in trusting a thousand dollar machine to be guided by an intelligence which cannot concentrate long enough to co-ordinate a few simple hand processes. Is it upon these that we are to lavish the most expensive form of public education? This is, perhaps, the worst count in the long indictment against the academic mind. It concedes recognition and grants equality to those who attain in surmounting the academic hurdles imposed by it. It has gazed, unseeing, down its patrician nose past those *who have chosen* to create the things which are symbolic of today's civilization. These things cannot be produced by imbeciles.

Our vaunted ability for planning and organization has led us into much trouble. In many communities shop teachers have little real voice in planning their working conditions. Many modern vocational school shops are less adapted to the teaching of the trades than were the old manual training shops at the turn of the century. The educational theorist has been at work. He sat on committees. He sorted the pooled recommendations of shopmen and sent them to the incinerator. He approved the plans of an architect who lowered ceilings to be able to tuck another floor into the same cubic space. He established the size of shops and the quotas of pupils per teacher with a fine disregard of the law of diminishing returns. He exudes a cockeyed enthusiasm and penchant for statistics. Did the unit vocational school idea originate with vocational school people? After the E.T. had assembled this Goldberg Juggernaut, he was going to make it run by paper work, by supervision, by Jupiter! It goes —but its wheels are full of emery.

The cry against large classes does not come from the tyro in the profession, but from the veteran. We can teach large classes *almost* as well as small ones. We cannot get to know the individuals. The large class reduces the pupil too frequently, to a spot on a seating chart and a card in the office files. Consequently, we do our stuff with the same monotony as a motion picture projector grinding out film. The teaching is sapped of vitality. The educational theorist makes himself ridiculous at this point by citing promotion rates of large and small groups. Shall we tell him the answer?

Many years ago, when teaching in a junior high school shop, I was assigned advisor to a large class of boys. That term all of my classes were overcrowded. The problems of supplies, insufficient equipment, work space, and the incidental bookkeeping gave that group a very poor advisor. From time to time, little notes, like distant echoes, reached me saying that John was in trouble. I talked to John, but not with him, and went back to my worries. It seemed that he did not do gym work. Graduation time rushed toward us. I totaled the points earned by the boys during the term on the cards. Graduation day came. I said good-by to the boys. The shop was still, they had all gone but one. John stood at one side of the room, staring out of the window, his back to me. Through a haze I seemed to recall a card which lacked two points for graduation — John's. Somehow I knew that his face was wet with hot, silent tears. He finally turned, his still quivering chin lifted a bit as he said, "I'm only fifteen and a half — but for the past two years I've bought all my own clothes." He worked for a nurseryman and gardener after school — so he failed in gym. In reaching upward toward manhood, he achieved shining success.— It did not show on the card.

Ruminations of a Shop Teacher on The Opening Day of School

*George M. Purvis**

Here is a little boy before me. He is a bit shy but somewhat curious. Or he may be blustery; if not now, as soon as familiarity loosens his tongue. He has so many things to tell his friends.

His feet are much larger than when he last shoved them under the desk and the old seat does not fit so well. His hands are larger, his arms and legs longer. His appearance is generally awkward yet occasionally you see that flash of gracefulness that only youth possesses.

For three months he has been galavanting around at will except when his father could induce him to do some work. He isn't going to like to sit in that seat very long. He's going to be crying for action.

He's different from every other boy in the class. All the forces and experiences that have been brought to bear on him, the inheritance of all his forefathers has made here a separate little individual personality. Like a piece of steel with stresses and strains pulling it this way and that, tending to warp it or to hold it true, so is this little boy with his myriad background of experiences and inherited traits. He isn't master of his own destiny. Not yet any way. As I see all those mannerisms develop, he seems more like a puppet on a string with his good behavior and his bad behavior unfolding before me.

From me must come much kindness, and tolerance, and patience. Yes, even love to qualify me to be his leader. For it is this feeling of affection which tempers the sharp retort and enables us to see beyond those irrepressible actions that the boy himself can neither explain nor fully understand. It is for me with kindness and firmness to direct him along that path that leads to self-control. Then he himself may do something about that destiny of his.

Out from those big brown eyes dart questioning glances at me. What goes on beneath that restive thatch of unruly hair? Is he wondering how interesting or tiresome I will be? How kindly or crabby, strict or easygoing?

When at last this first shop period is over I hope he has the situation sized up something like this:

"Here is a teacher who is interesting. How quickly the period passed! I guess he is going to make us work — my gosh, we went to work the first day! But he isn't crabby — is he? He won't stand for much fooling around, that's certain. However, I'll try him out later."

*Ojai, Calif.

Industrial Arts and Vocational Education

John J. Metz, Editor

ONE OF AMERICA'S GREAT SONS

The month of October marks the centenary of the birth of one of America's greatest inventors — George Westinghouse. So full of interest is the life of this man, that a study of it ought to be made obligatory to every student of industrial arts and vocational education. Not all of us can be great inventors, but all of us can gain something from studying what this man accomplished in his lifetime through study, application, and perseverance.

George Westinghouse was born in Central Bridge, N. Y., October 6, 1846. From earliest youth he showed great interest in things mechanical, so much so that when he was but 19 years of age, he succeeded in getting a patent on a rotary steam engine.

The many improvements that he inaugurated for the railroads had far-reaching results in hastening the growth of our country during its formative years. The first of these inventions was a car replacer which he patented when he was twenty years old. Then he began to manufacture this useful piece of railroad equipment, and thereby seemed to have set a pattern for his future inventions, because he founded over sixty business enterprises to manufacture the things for which patents were granted to him during the next fifty years.

His next important invention was the air brake. The Panhandle Railroad was the first to give this brake a trial. On the trial run, which was conducted in April 1869, the value of the brake was demonstrated most effectively when the train was quickly brought to a standstill just before striking a horse and wagon that had dashed in front of the engine at an intersection with the highway. The Westinghouse Air Brake Company was organized in July of that same year.

His invention of the friction draft gear, and of automatic interlocking switches and signal devices showed his deep knowledge of and interest in the problems of railroading which were becoming increasingly more complex with the expansion of railroad travel in America.

But his inventive mind also saw the need of industry to find new sources of power for developing America's growing industrial ventures. It is quite understandable that his interest should be drawn toward electricity which was just beginning to show promise. Its use on telegraph and telephone lines was already established; hence, one is not surprised that Westinghouse invented an automatic telephone exchange in 1880. From this venture in electricity grew the Union Switch and Signal Plant in Pittsburgh. Then followed experiments with the incandescent lamp and soon he was building direct current lighting equipment for hotels and cities.

Then natural gas aroused his interest, and, because it was known that natural gas abounded in Pittsburgh where he lived, he started in 1883, drilling for gas in his own back yard. After the workmen had sunk the well from 1600 to 1700 feet, gas was found, and in such quantities that it all but wrecked the drilling equipment as it emerged. But Westinghouse devised a way to cap the well, and soon after he patented a system for conveying and utilizing gas under pressure. Then followed 28 other patents to eliminate the dangers met with in using natural gas. The Philadelphia Company which he organized to develop the sale and use of gas by the industries in Pittsburgh is still in existence.

In 1885, he began to experiment with alternating current electricity with the idea of substituting it for direct current which has excessive losses over longer circuits.

Out of these studies came numerous other developments and patents. The crowning event was when he was given the contract to light up and furnish the electric power for the Columbian Exposition which was held in Chicago in 1893. Since the lighting at this fair was all on an alternating circuit, Westinghouse hurriedly built a rotary transformer which converted alternating current into direct current electricity for those exhibitors who had to use direct current electrical motors on the machines which they exhibited. The Cataract Construction Company, which was studying ways of harnessing the Niagara Falls for the purpose of generating electricity went on record as favoring alternating current and awarded him the contract to build three 5000 horsepower generators for converting the energy of Niagara Falls into electrical energy. Nineteen months later these generators were delivering electricity over a distance of twenty miles to Buffalo, a thing unheard of up to that time. In a comparatively short while the electricity developed at Niagara was furnishing the power requirements of a large part of the western section of the state of New York.

His early interest in the rotary steam engine again was revived when he and his engineers began to work on the development of the steam turbine as the motive power for driving large alternating current generators. The first generator thus equipped was installed in his own air brake plant. The following year, 1900, saw a similar but much larger turbogenerator erected for the Hartford Electric Light Company, the first one of its kind to develop electricity for a central station. In a short while the steam turbine practically replaced the steam and gas reciprocating engines previously used for generating electricity.

His experiences obtained through the transmission of electricity over long distances had proved to him the economy and efficiency of alternating current and he began to study the question of applying it to locomotives and street railway systems. His success with the Manhattan Elevated and the New York Subway, and the electrification of the New York, New Haven, and Hartford Railroad in 1907 proved the soundness of his ideas.

He next turned his attention to perfecting a gear drive which would reduce the high speed of the steam turbine so it could be used to supply the power required to drive the propellers of ships. In 1911 the first of these machines was installed in the 20,000-ton navy collier "Neptune," and the venture proved highly successful, with the result that the turbine began to replace the reciprocating steam engines previously used to drive the propellers of the large steam vessels.

George Westinghouse had always worked very hard and in 1913 his heart showed the effects of this constant drive. His doctors ordered him to take a complete rest. It was too late, however, and on March 12, 1914, he passed away.

His genius had accomplished much, and though he was honored highly both in this country and abroad, he had the modesty to say:

"If some day they say of me that in my work I have contributed something to the welfare and happiness of my fellow men, I shall be satisfied."

A fine example of the ideals the teachers of industrial arts and vocational education should inculcate in the minds of their students.

Fire Prevention Week

Statistics have been collected which show that seven schools catch fire every day during the school year. Participation in the *Fire Prevention Week* set for October 6–12 may cause a general realization that carelessness and recklessness are costing the educational system of our country great losses in both lives and money.

Problems and Projects

LOOMS AND WEAVING FOR INDUSTRIAL-ARTS TEACHERS

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Probably the most outstanding of the objectives claimed for the courses in industrial arts is the interpretation of modern industry to boys and girls. One of the most important of these modern industries is the textile industry, for everybody comes in contact with the products of this industry every day. The clothes we wear, the draperies and rugs in our homes, and the upholstery in our automobiles are only a few examples of these products. Surely such an important industry deserves a place in the program of industrial arts.

Many of the larger schools have some of the laboratory equipment that is necessary for the proper interpretation of this important manufacturing business, but most of the smaller schools lack this equipment, and as a consequence these smaller schools fail to include any preparatory training for this industry in their course outlines. Many of the smaller schools are not financially able to purchase even the simplest of equipment for such an area in the industrial-arts program even though these are relatively inexpensive. It is for the teachers in these smaller schools that this article is presented.

The study of the whole textile industry can be centered around and motivated by some simple looms on which the pupils can weave small rugs, mats, scarves, belts, and other rectangular pieces.

The two looms described in this article are of types that are comparatively easy to warp, and the weaving process is so simple that pupils in the elementary grades can perform the work readily. These instruction sheets have been used experimentally in our laboratory, and satisfactory looms and fabrics have been produced by young women who have had a minimum of shop instruction.

The purpose of this article is to show how to construct two simple types of looms and to explain how these looms are warped and how they are used for weaving. By using the common woodworking tools, any industrial-arts instructor or handyman will be able to construct one or both of these looms in a fairly short time. The addition of a textiles area to the industrial-arts laboratory will help the instructor to attain the objectives which are claimed for his courses.

The Box Loom

The simpler of these two types of looms is the box loom, shown in Figure 1. This loom consists of a small wooden box with extensions nailed to the corners and a long bottom board to which an extention arm has been fastened. This simple loom can be used for weaving narrow articles such as belts, hatbands, and ties made of carpet warp and cord. If the box is large enough and the extension arms are long enough, even scarves may be woven by this method. The directions given here are for the construction of a small loom, but the size of the box and the length of the extension arms and the bottom board may be varied to suit the type of material or article to be woven.

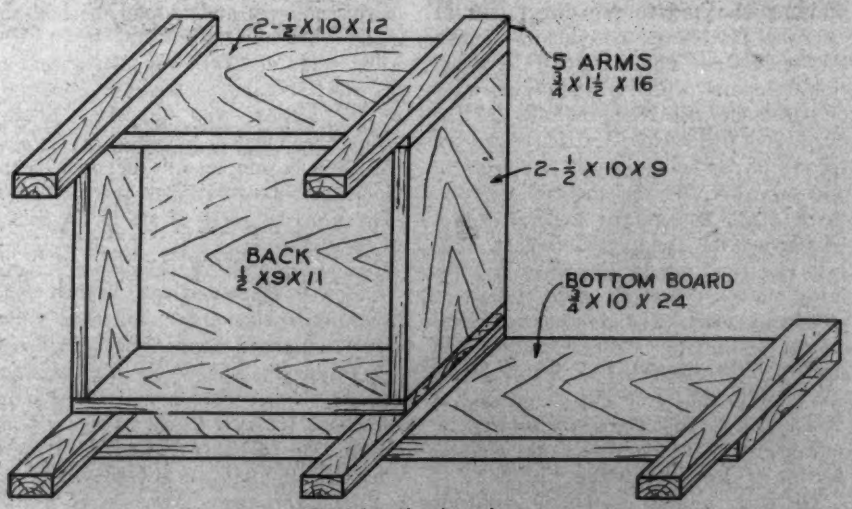


Fig. 1. The box loom

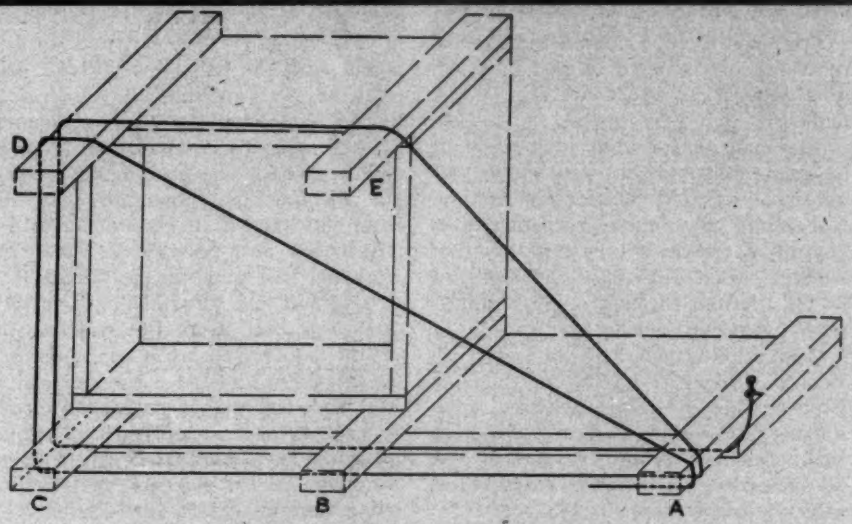


Fig. 2. How to warp the box loom

Steps in Making a Box Loom

1. The box should be made about 10 in. wide, 12 in. long, and 10 in. deep. It should be made of lightweight material about ⅜ in. thick.

2. Cut five pieces of wood ¾ by 1½ by 16 in., and plane them until they are smooth. These are the extension arms.

3. Nail four of these extension arms to the corners of the box as shown in Figure 1. This will leave about 6 in. sticking out over the open end of the box.

4. Cut a bottom board ¾ by 10 by 24 in., and nail it to the extension arms as shown in Figure 1.

5. Nail the fifth extension arm to the end of the bottom board so that one end sticks out in the same direction as the extension arms on the box. The warp is to be wound around these five extension arms, so they must be sanded until they are smooth and the corners are rounded.

6. A back may be nailed to the farther side of the box so that weaving materials can be stored in the box.

How to Warp the Box Loom

1. Drive a thumbtack near the end of the bottom board and tie the warp to it as shown in Figure 2.

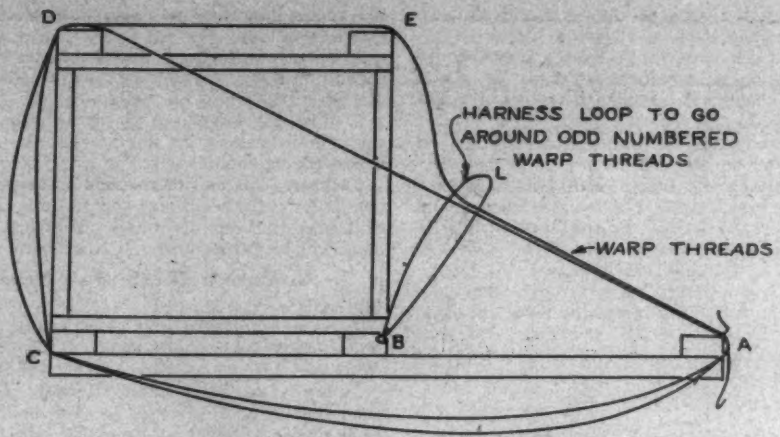


Fig. 3. The harness of the box loom. Loops are passed around each odd numbered warp thread and around the extension arm at B. The loops are tied so that the odd numbered threads are parallel to the even numbered threads.

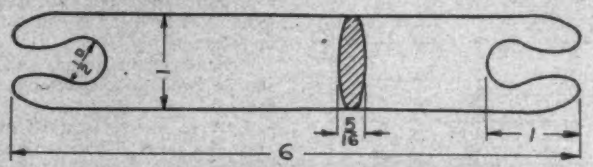


Fig. 4. The shuttle

2. Start to wrap the warp thread around the extension arms as shown in Figure 2. Begin at arm A and carry it outside of arms B, C, D, E, and back to A.

3. Release the end from the thumbtack and tie it to the first warp thread at arm A.

4. Carry the warp thread around arm A and on around B, C, D (skip E) and back around arm A again.

5. Continue by making the odd-numbered strands like the first warp thread described in step 2, and the even-numbered strands like the second thread as described in step 4.

6. Continue this warping until the combined strands are as wide as desired and tie the end to the last warp thread on arm A.

7. Using pieces of carpet warp, make a loop around each odd-numbered warp at L, Figure 3, and tie the loops around the middle bottom arm so that each warp thread is pulled down parallel to the even-numbered warp threads. This is called the harness.

How to Make the Shuttles

Procedure:

1. Prepare two pieces of ¼ by 1 by 6-in. close-grained wood.

2. Lay out the ends as shown in Figure 4.

3. Cut to shape on the jig saw or by using a coping saw.

4. Sand both faces and edges until smooth, and taper the edges until the cross section will be similar to that shown in Figure 4. One of these will be used as a shuttle and the other as a beater.

5. Apply a thin coat of shellac or lacquer, and when it is dry, sand very lightly so as to cut off the "whiskers" that have been raised by the finish. The shuttle must be perfectly smooth so that it will not pull the warp threads as it passes through the shed.

How to Weave on the Box Loom

1. For your first weaving select ⅛-in. cotton rug filler for the woof threads. Since this will be larger than the carpet warp which you used for the warp threads, the woof will be conspicuous in the finished web, and therefore, produce a woof pattern. If the rug filler had been used for the warp threads, and the carpet warp for the woof threads, a warp pattern would be produced. Wind the woof thread around the shuttle from end to end until the shuttle is almost full.

2. Put the left hand across the warp as shown in Figure 5 and press down. This separates the alternate warp threads so as to make a *shed* through which the shuttle can be pushed or *shot*.

3. Push the shuttle through the shed and leave a few inches of the woof hanging until the web is woven.

4. Put the left hand *under* the warp threads as shown in Figure 6 and lift up to form another shed.

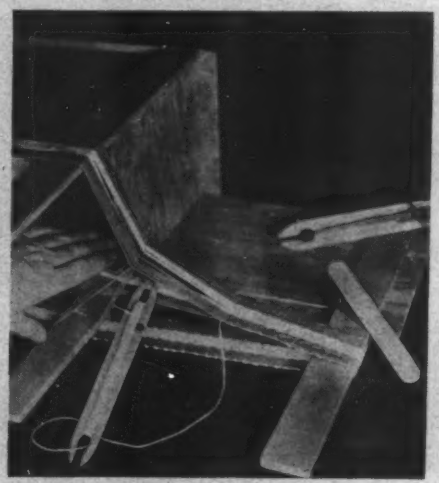


Fig. 5. Pressing down

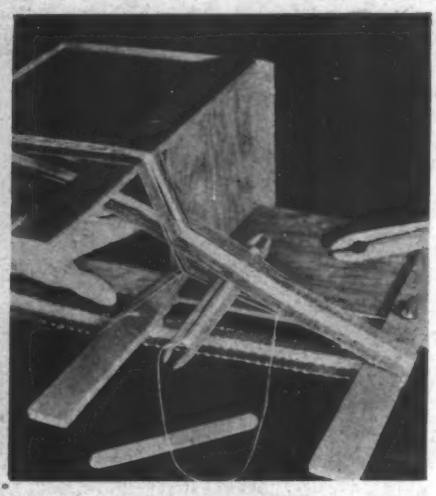


Fig. 6. Lifting up

5. Push the extra, empty shuttle into the shed and pull the first woven thread toward the arm on the end of the bottom board.

6. Remove the empty shuttle, known as the beater, and shoot the woof thread back through the new shed.

7. Make another shed by pressing down on the warp threads, insert the beater, and draw the second woven thread down against the first.

8. Repeat steps 3, 4, 5, 6, and 7 until the shed gets too small to permit the passage of the shuttle.

9. Revolve the warp and woven web around the arms of the loom until the weaving area is near the arm on the end of the bottom board.

10. Continue weaving and revolving the finished web until the first woven woof thread is past the arm on top of the box.

11. Use scissors to cut all of the warp threads about halfway between the first and last woven woof threads.

12. To finish the web, tie the first two warp threads to the third and fourth, tie the fifth and sixth to the seventh and eighth, and continue tying two pairs of threads together until all warp threads are knotted. Trim the fringe with the scissors.

The Rug Loom

The other loom described in this article is a rug loom. It is called a rug loom although not only rugs, but also runners, scarves, and other rectangular articles can be woven on it. The loom should be made wide enough to accommodate the widest rug desired, and its length should be a little more than half as long as the rug to be woven. These looms are simple in construction and comparatively easy to make, so it will be desirable to make several sizes in order that several sizes of rugs may be woven. Narrow rugs can be woven on wide looms by using only enough harness threads to accommodate the warp used, but the length cannot be reduced without wasting warp threads. After one of these looms has been constructed, it will be easy to see how wider ones and longer ones can be made. The loom described here is 12 in. wide, 24 in. long, and about 4 in. high. A scarf or runner about eight inches wide and 36 in. long can be woven on it, and a fringe 2 in. long will be left on each end.

Wool knitting yarn may be used for both the warp and the woof threads, and it will make a pleasing basket weave. If the same colors are used for both warp and woof, the scarf will be a solid color. If one color is used for the warp, and a tint or another shade of the same color is used for the woof, an attractive effect of mingled colors will result. Cross stripes may be produced by putting in a few shots of woof threads that are different in color from the other woof threads. Lengthwise stripes are produced by putting in warp threads of the desired colors. This must be done as the loom is being warped. The first rug (or scarf) should be woven without stripes so that the process of weaving can be mastered before the development of more intricate patterns is attempted.

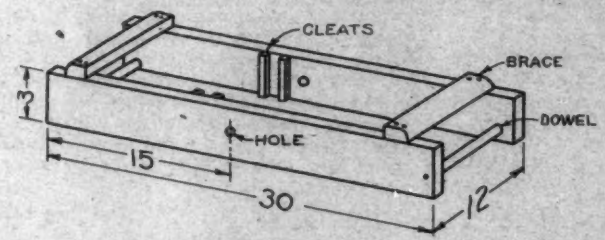


Fig. 7. The frame of the rug loom

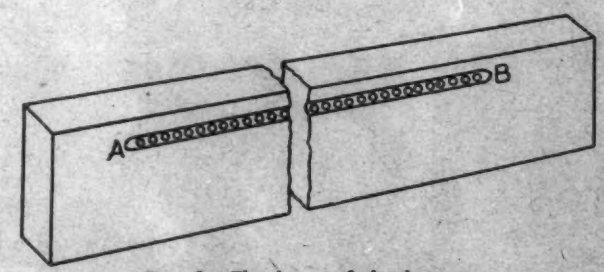


Fig. 8. The base of the beater

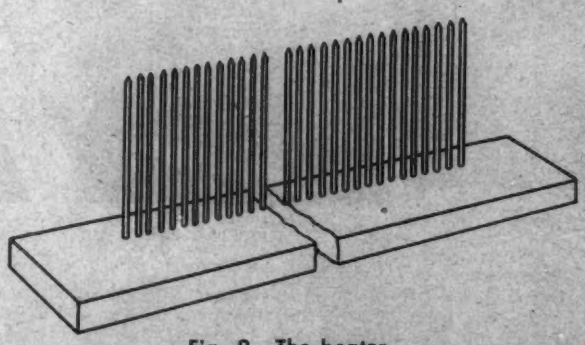


Fig. 9. The beater

The complete rug loom consists of a frame, a beater, a heddle, and two shuttles.

How to Make the Frame of the Rug Loom

Materials needed:

2 sides, ¾ by 3 by 30 in.
2 braces, ¾ by 2 by 12 in.
4 cleats, ½ by ½ by 3 in.
2 dowels, ¾ by 10½ in.
8 screws, No. 8 by 1½ in. r.h.b.

Procedure:

1. Square up the two sides to dimensions.
2. Bore a one-inch hole in each with centers halfway between the ends and halfway between the sides, as shown in Figure 7.
3. Attach cleats with brads. These should be ⅜ in. apart and about 1 in. from the center holes. These are the slides for the heddle.
4. Square up the braces to dimensions and round off an arris on each.
5. Attach the braces with two roundhead screws in each end. The rounded edge should be about 2 in. from the end of the frame.
6. Drill holes in the ends of the dowels to fit an 8d common nail loosely.
7. Drill smaller holes through the sides near the ends (1 in. from the lower edge and 1 in. from the end), and insert 8d nails through the sides and into the holes in the dowels to form the rollers. These rollers should turn freely on the nails.

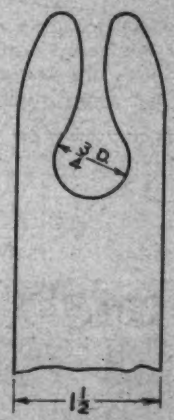


Fig. 10. The shuttle

How to Make a Beater or Comb

Materials needed:

1 piece, yellow poplar (soft), ¾ by 2 by 15 in.
8d finish nails, one for each warp thread (49 for this loom)

Procedure:

1. Square the wood piece to size.
2. Make a line AB, Figure 8, ½ in. from the edge with A and B each 3 in. from the ends.
3. Set the dividers to 3/16 in. and step off equal divisions (3/16 in.) from A to B. Press the points into the wood so that the marks can be seen easily.
4. Select a drill that is a little smaller than an 8d finish nail and drill a hole in the board at each of the marks on the line.
5. With a veining tool of the carving set, cut a groove along the line so that the nail heads will be countersunk.
6. Insert nails and drive them through the board until the heads are countersunk. If a drill press is used in drilling the holes, the nails will be perpendicular to the board.

To Make a Shuttle (Two Needed)

Materials needed:

2 pieces 3/16 by 1½ by 15 in. yellow poplar or other close-grained wood.

Procedure:

1. Bore two ¾-in. holes in each. These should have centers which are 1¼ in. from each end and equidistant from the sides. Use a Forstner bit.
2. Set the dividers at ¾ in. and lay out a semicircle at each end of the pieces. These will be tangent to the sides and the ends.
3. Saw along each semicircle and into each ¾-in. hole so that the end is shaped as shown in Figure 10.
4. Sandpaper all edges and surfaces of the shuttle until no splinters remain to catch the threads.
5. Wrap the woof thread around the shuttle once and tie it. Then continue wrapping until the shuttle is filled. If two colors are being used, put one color on the first shuttle and the other color on the second shuttle.

How to Make the Heddle

Materials needed:

2 ends, ½ by ¾ by 6-in. softwood
1 base, ¾ by 1 by 9¼-in. softwood
1 stiff wire 12 in. long
1 dowel ⅜ by 12 in.
4 5d box nails (or 4 No. 6 by 1½-in. f.h.b. screws)
25 pieces of carpet warp 15 in. long
25 carpet tacks

Procedure:

1. Cut ends and base to dimensions.
2. Bore a ⅜-in. hole in each endpiece, ¾ in. from one end.
3. Drill a hole in the center of each endpiece. This hole should be just large enough for the wire that is used.
4. Nail the ends to the base as shown in Figure 11. Drill holes for these nails to avoid splitting the wood. Flathead screws may be used, but they must be countersunk.

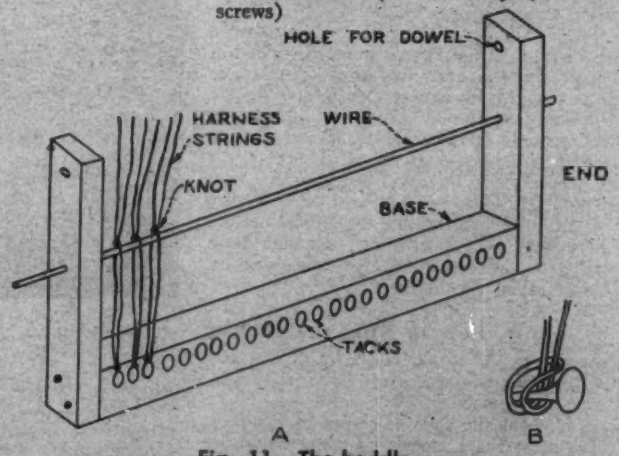


Fig. 11. The heddle

5. Mark a straight line from end to end along one side of the base, and about ½ in. from the edge. Set the dividers to ⅜ in. and step off ⅜-in. steps on this line.

6. Drive a tack at each step mark, but leave ⅛ in. of the head sticking out.

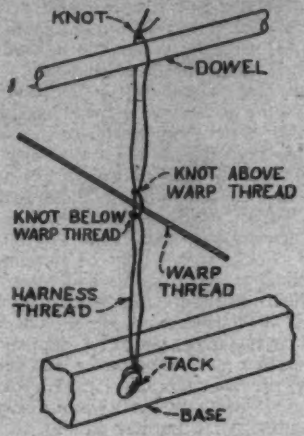


Fig. 12. Cutaway view of a harness thread on the heddle

9. Hold one end of the warp on one side of the wire, and the other end of the warp on the other side of the wire.

10. Tie these ends together *above* the wire as shown at A, Figure 11.

11. Continue this until all tacks are filled.

How to Warp the Loom

1. Place the beater in the center of the frame with the nail points up.

2. Tie the beater securely with carpet warp in the middle of the frame as shown in Figure 13.

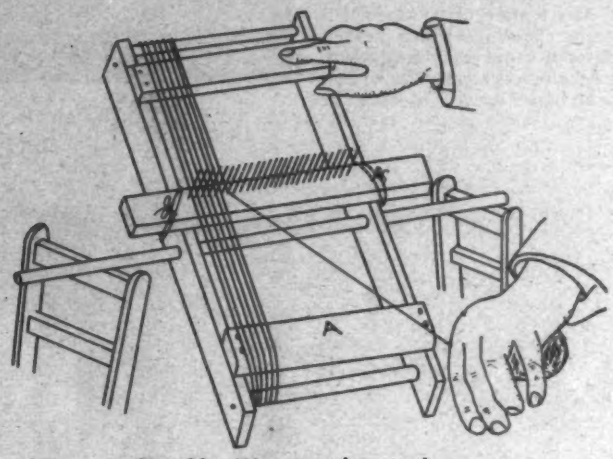


Fig. 13. Warping the rug loom

Fig. 14. The rug loom showing the harness partly fastened in place

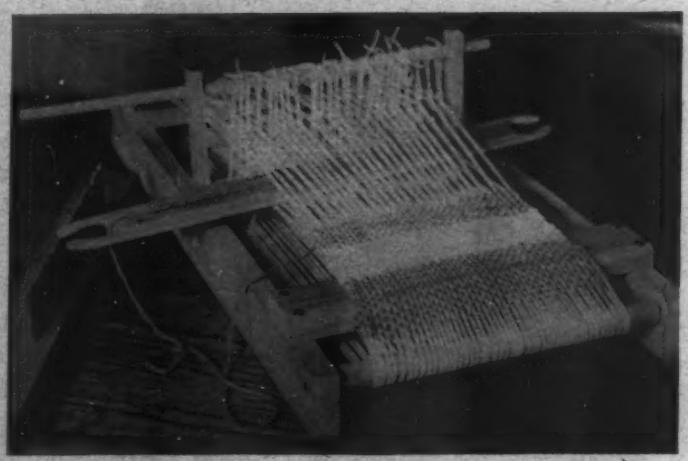


Fig. 15. The rug loom in use

3. Place a broom handle through the holes in the frame and support the ends of the broom handle on the backs of two chairs. This leaves the frame so that it will turn freely on the broomstick.

4. Hold one end of the warp on the brace, A, on the longer end of the loom and pass it around the frame so that it passes over both rollers and between the first and second nails of the beater, and tie the end to the warp. This makes a single loop around the frame with the knot over the brace. (Use a knot that will not slip.)

5. Turn the loom over and over as you thread the warp evenly around and around the loom with a warp thread between each two nails of the beater.

6. Continue until the beater is filled, and tie the end of the string to the last warp thread so that the knot is over the same brace on which the warp started.

7. Put the partly finished heddle in the slides and under the top warp threads, and insert the top dowel in the heddle.

8. Tie the *first harness threads* around the *first* warp thread, and tie again above the dowel.

9. Tie the *second harness threads* around the *third* warp thread and around the dowel.

10. Tie the *third harness threads* around the *fifth* warp thread and around the dowel.

11. Continue tying harness threads around the alternate warp threads and dowel until the heddle is completed.

12. Pull out the wire, and remove the beater.

How to Weave on the Rug Loom

1. Procure two leash sticks. These may be ⅜-in. dowels, or they may be ¼ by ½ in. and about ½ in. shorter than the rollers.

2. Lift the heddle with the left hand.

3. Insert a leash stick in the shed formed by the warp threads.

4. Release the heddle and push it down to make another shed.

5. Insert the other leash stick.

6. Lift the heddle again.

7. Push the shuttle through the shed, and leave a strand of woof thread in the shed. This is called a *shot*.

7. Put the wire through the center holes of the ends.

8. Take one of the pieces of carpet warp, double it, and loop it around the first tack as shown at B, Figure 11. Use square knots, and do not pull them tight.

12. This part of the heddle must be placed on the loom under the top warp threads before tying the other knots. See steps 7–12 on "How to Warp the Loom."

8. Push the heddle down and pull the first woof thread back against the leash stick with the beater. This is done by pulling the beater back firmly and evenly with the nails still between the warp threads, with points down.

9. Shoot the shuttle back to the other side by putting it through the shed; work the heddle; and use the beater.

10. Continue this routine until the shed is too small to receive the shuttle; then pull out the leash sticks and move the warp, woof, and web around the rollers about 6 in. so that the shed is again large enough to take the shuttle.

Fig. 1. The pirate chest

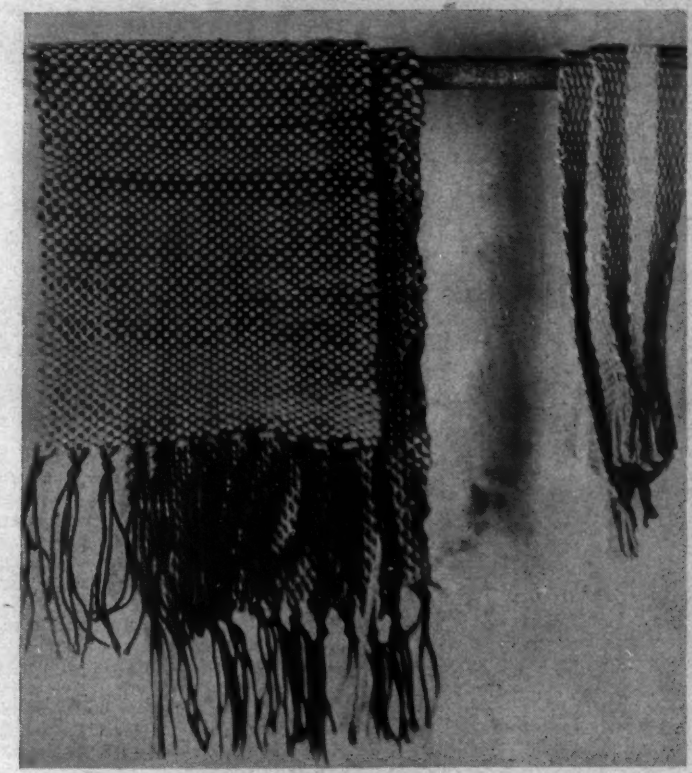


Fig. 16. Products of the looms

The sturdy woolen scarf on the left was woven of two tones of knitting yarn on the rug loom. The cotton belt was made on the box loom

11. Continue weaving and moving the web around the rollers until the first woof thread reaches the back of the heddle.

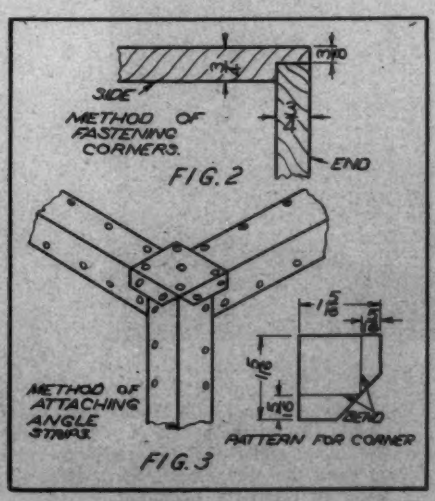
12. Use scissors to cut straight across the warp threads about halfway between the first and last woof threads.

13. Smooth the rug flat on the table and tie the ends of the warp threads. Do this by tying the first two threads to the next two threads, and continue this sequence until both ends of the rug are fringed. Trim the fringe with scissors.

A BOY'S CHEST

E. A. RERUCHA
Franklin Park, Ill.

Most wideawake boys delight in owning a pirate or treasure chest. One has only to make one to realize the fascination and enjoyment experienced by the youngster. Aside from sentiment, it is a very practical project and one that again serves youthful desires, that is, to keep their possessions under lock and key.



The chest shown in Figure 1 is one of many designs that may be made. Ancient pirate and treasure chests, illustrations of which may be found in any library, can be imitated and decorated with ships, pirate scenes, etc. The chest illustrated is a treasure chest decorated with scenes of childhood and storybook characters and animals, things which have a romantic appeal to the average boy.

White pine was used for the chest. The joints at the corners were made as shown in Figure 2. Screws are used for assembling. Sand the chest smooth as for a varnish finish. The illustrations are drawn with pencil or traced on with carbon paper. Pictures may be obtained from various sources, such as magazines, newspapers, and children's color and picture books. Scenes may be developed by assembling various pictures and filling in, or individual illustrations may be used. After the scene is arranged, the outline is burned in with a pyrographic pencil. A simple device for operation on a transformer was described by the writer on page 118 of the March, 1929, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. After burning in the outline of the design, the illustrations are colored with water colors. When dry, two or three coats of clear transparent varnish such as is used on linoleum, are applied. The interior of the chest is also varnished. Paint the bottom. After the metal strips and corners are attached the top and sides are given a good coat of polishing wax.

The edges and corners are covered with galvanized sheet iron. The strips are cut 1⅝ in. wide and bent at right angles. They are nailed to the wood with escutcheon pins ¾ in. long. The corners are made as shown in Figure 3. Before attaching, the metal is given an aged appearance by heating in a gas flame and brushing with a solution of copper sulphate.

The space available, or particular requirements will naturally determine the size and shape of the chest. The chest shown in the illustration is 10 by 22 by 42 in. It was made this size because it has to be kept under the boy's bed as there is no other space available in an otherwise crowded room.

Surprising results are obtained with this particular type of decoration. The characters and scenes have a very lifelike appearance. Anyone with patience can produce excellent results.

PLANER GAUGE

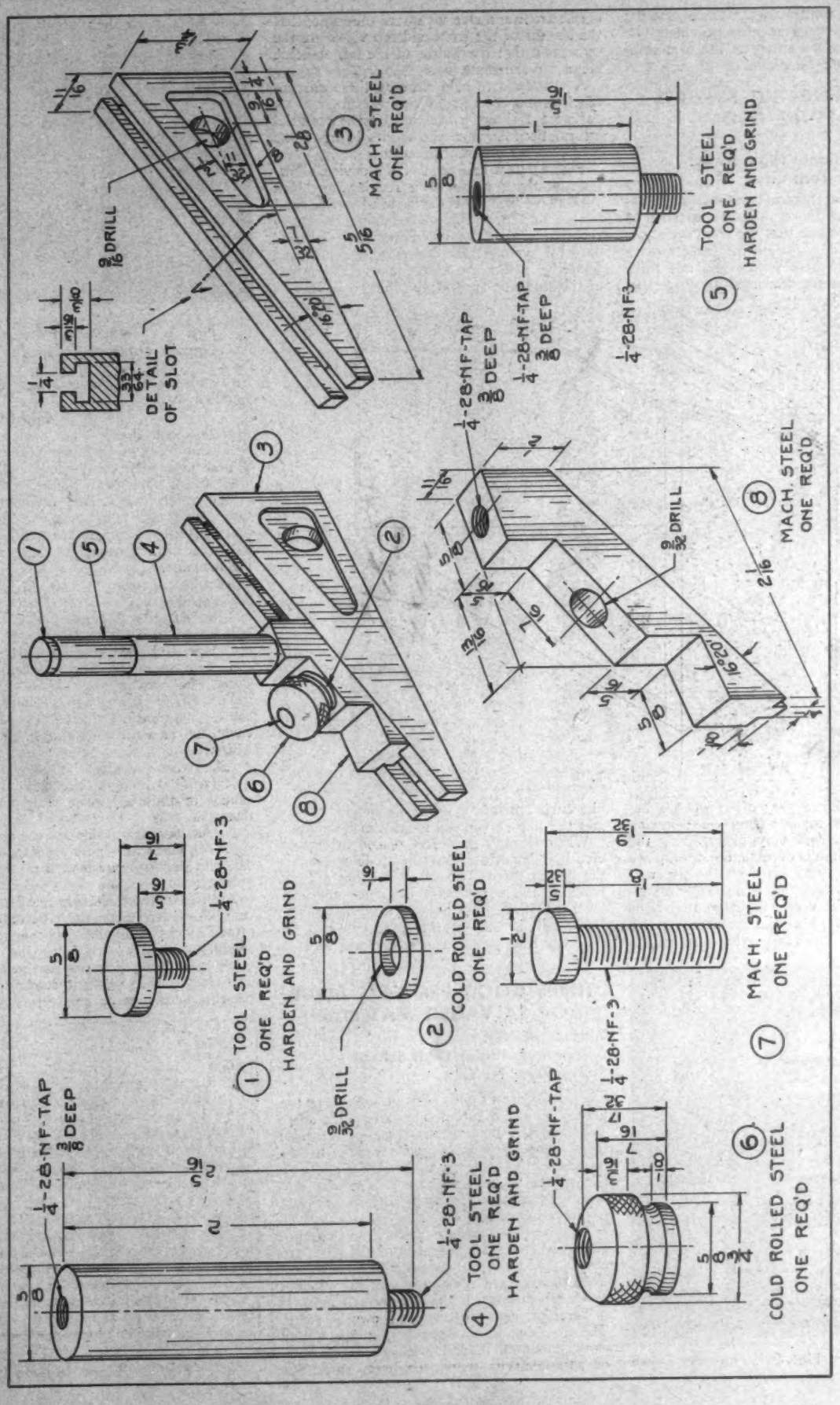
WILLIAM A. DEVETTE
Technical High School
Erie, Pa.

The planer gauge in the accompanying illustration is a project designed to be made by the students in the machine-shop classes. It is presented as a drawing problem so that the students may make their own detail drawings in the related drawing classes, and then work from them in the shop. This, of course, requires co-operation between drafting and shop instructors, something very essential in all technical and vocational schools.

This project, made entirely from rolled bar stock, does not require the assistance of pattern shop or foundry, and as such will not involve any finish marks on the drawings.

The assembly drawing is self-explanatory, the gauge being used with or without parts 4 or 5, in order to obtain the necessary range of heights.

The project may also be used as an assem-


3 MACH. STEEL ONE REQ'D
DETAIL OF SLOT
5 TOOL STEEL ONE REQ'D HARDEN AND GRIND
1 TOOL STEEL ONE REQ'D HARDEN AND GRIND
2 COLD ROLLED STEEL ONE REQ'D
8 MACH. STEEL ONE REQ'D
4 TOOL STEEL ONE REQ'D HARDEN AND GRIND
6 COLD ROLLED STEEL ONE REQ'D
7 MACH. STEEL ONE REQ'D

Planer gauge designed by William A. DeVette, Technical High School, Erie, Pa.

bly and detail problem in the trade drafting classes. In this case the student should be required to make his own part list to accompany the assembly drawing.

A TEACHING AID FOR THE DRAFTING ROOM

FRED SIEGEL
Bronx Vocational High School
Bronx, New York City

In teaching mechanical drawing to beginners one of the more difficult concepts to drive home is the one that the front view, top view, and the side view are the three aspects or views of the same object and not three separate and distinct drawings.

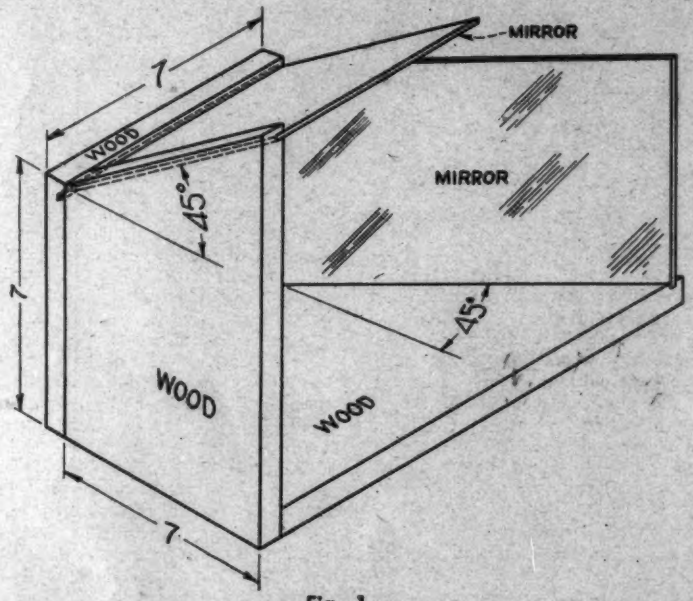


Fig. 1.

This fact is shown very often when a beginner is asked to make a three-view drawing of an object. He will very likely string the three views alongside of each other or place them haphazardly any place on the paper.

The fact that position is unimportant to him shows that he does not realize that he is to draw three views of the same object. He very often does not realize that the heights of the front and side views are the same, that the lengths of the front and top views are the same, and that the widths of the top and side views are the same.

A visual aid to help clear up these misconceptions has been found very useful.

Figure 1 shows a sketch with the essential information. Anyone who wishes to build one can work up his own dimensions.

Figure 2 is a half tone of the device, showing the three views of a rectangular block with a hole in it. This device must *not* be used for asymmetrical objects because the mirrors reverse the side and top views. The device is only for symmetrical objects, and if not used properly, will cause confusion in the minds of the students. If used with the proper objects like cubes, prisms, cylinders, cones, pyramids, and the like, it will aid greatly in learning.

When viewing an object placed in the device it is important that the student stand at the proper place. This place is about 6 ft. in front of the object with his eyes on a line level with the center of the front view. From this point he will see the three views of the object in their proper size, shape, and position.

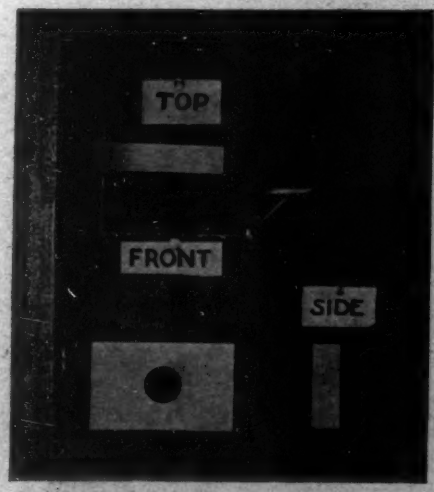


Fig. 2

THREE GOOD PROJECTS MADE OF SALVAGED MATERIAL

C. H. SCHEINER
Montauk Junior High School
Brooklyn, N. Y.

Students are usually very responsive to the utilization of old automobile parts in the shop. The projects, made from these parts, aside from being very useful, offer wonderful opportunities for leisure time activities and help the pupils to become wiser consumers and more intelligent participants in a society that is markedly industrial.

The old parts are purchased from automobile wreckers. Since very few of the parts are alike, the problems become individualized. The students are constantly confronted with new problems which they enjoy solving.

Three of these projects are shown herewith. The first one is an eight-day, spring wound clock, mounted in an 18-gauge nickel silver or aluminum or copper or brass case. The

Fig. 1. Timepiece from an old Lincoln automobile; nickel silver

Swiss movement in Figure 1 came from an old Cadillac car.

Eight-Day Clock

Materials and Tools

A. One piece of 18-gauge nickel silver 5 by 8½ in. One piece of 18-gauge copper 2¾ by 4 in. Clock movement. Solder and flux.

B. Scratch awl, ruler, dividers, jeweler's saw frame and blade, mallet, pliers, center punch, setting hammer, hand drill and a No. 12 twist drill. Turning machine and crimping machine.

Procedure

1. Obtain the necessary material and lay out the shape of the clock holder. See Figure 2.
2. Cut to shape with a pair of shears.
3. Remove sharp edges with a file.
4. Clean with emery cloth.
5. Measure diameter of clock. All the clocks come with a rim on face. Do not include the rim when measuring the diameter.
6. With a pair of dividers scribe a circle equal to this diameter.
7. Drill a hole within this circle, large enough to allow a jeweler's saw blade to pass through.
8. Cut out the opening for the clock.
9. The clock may now be fitted into place. The rim should be flush with the front of the holder.
10. The method of holding the clock to the case will depend upon the type obtained. One of the clocks in Figure 1 is mounted with 3 small machine screws from the rear. The other clock has a rim that can be screwed off. The clock is then passed through opening and the rim is screwed back in place.

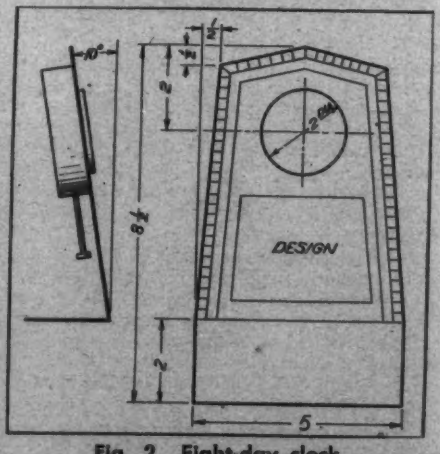


Fig. 2. Eight-day clock

11. Remove clock and design an appropriate motive for the front. A small calendar holder may be substituted in place of a design.
12. Transfer this design to a piece of copper and cut out with a jeweler's saw.
13. Sweat solder design to case.
14. Set turning machine for a bead about ⅜ in. from edge of case. The bead is made all around the case except for 2 in. from bottom.
15. With a crimping machine put a crimp next to the bead. If turning and crimping machines are not available, ball peen the edge instead.
16. Two inches from bottom make a bend slightly more than 90 deg. This may be done in cornice brake or between two blocks of wood.
17. Steel wool and buff with tripoli and rouge.
18. If a high polish is desired, finish with clear lacquer.
19. Mount clock in place.
20. Glue a piece of felt or leather to the base.

Electric Fan

The second project is an electric fan, made from the heater fan of an automobile, plus a small transformer. The idea of this project came about one very hot June day when a fan seemed to be needed very badly.

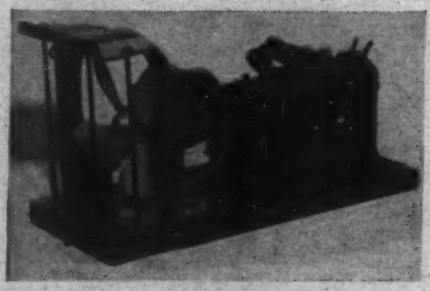


Fig. 3. A salvaged automobile-heater fan

Materials and Tools

A. One piece of wood ¾ by 5½ by 12 in. Small transformer 6–8 volts; old heater fan; ten 6–32 machine nuts; one 3-ft. piece of ⅛-in. copper covered wire. Two pieces of band iron ⅛ by ½ by 6 in.

B. Scratch awl, ruler, dividers, hack saw, pliers, setting hammer, stock and die 6–32, screw driver, hand drill and twist drill. Crosscut, ripsaw, and plane.

Procedure

1. Obtain a piece of wood, the ends of an orange box may be used, and square it to dimensions.
2. Plane a 3/16-in. chamfer all around.
3. Cut 5 pieces of the ⅛-in. wire, 7 in. long.
4. Thread both ends for a distance of about one inch.
5. Drill holes in outer frame of fan for the ⅛-in. wire. The wire acts as a guard. See Figure 3.
6. Drill holes in base for wire.
7. Assemble guard and screw it to the base.
8. Two legs may be made out of the band iron to support the back of the motor.
9. Fasten the transformer to the base.
10. Connect fan to transformer.
11. Paint entire job, except the blades, black. The blades are painted white or aluminum.

A commercial electric fan and one of our shop-made fans were tried out. At the end of a day of eparation it was found that the commercial fan motor was very hot while the heater motor was remarkably cool.

Compressor

The last project is a small compressor that all automobile wreckers have lying around in one type or another of old automobiles. This

Fig. 4. Compressor from old automobile

compressor may be used for spraying, hard soldering, and pumping tires.

Materials and Tools

A. One piece of wood ¾ by 10 by 14 in. Compressor from old automobile; a 2-in. pulley and a 6-in. pulley; electric motor; V belt; one piece of band iron ⅛ by ½ by 3 in.

B. Scratch awl, ruler, hack saw, pliers, setting hammer, screw driver, hand drill, brace, countersink, ripsaw, crosscut saw, and plane.

Procedure

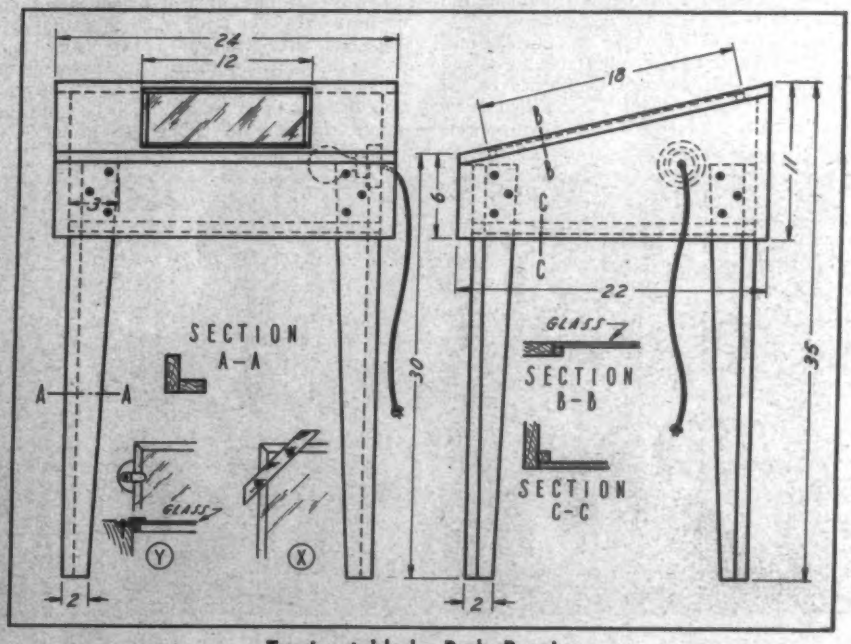
1. Square base to dimensions.
2. Glue and screw mounting block to base. The size of this block will depend upon the compressor obtained.
3. Wash the compressor with gasoline and dry thoroughly.
4. With a hack saw cut away front section so that shaft will be free.
5. The gear shown in the picture now can be taken off the shaft. In place of gear, fasten a 6-in. pulley in place.
6. As shown in picture, mount compressor with band iron.
7. Fasten a motor, preferably a ¼ h.p. to the base. See Figure 4.
8. On the shaft of the motor place a 2-in. pulley.
9. Connect motor and compressor with a V belt.
10. Before running the compressor, fill the well with a good grade of motor oil.

TRACING TABLE

RUDY RENZIUS
Pickering College
Newmarket, Ont., Canada

It was a common sight at our school to see a youngster at a window trying to copy or trace a map, so we designed a simple tracing table that could be built by the students and not involve too many difficult operations. We decided against mortise-and-tenon joints and the result was a table that is screwed and glued together. It can be made with hand tools and is surprisingly strong. The four legs are screwed together as shown in section A-A. The top has a 12 by 18-in. plate glass (old windshield) insert as shown in section B-B with ½ by ½-in. strip nailed under the glass. The legs are screwed to the inside of the frame, and a ⅜-in. bottom is nailed on ½ by ½-in. strips, as shown in section C-C. On the inside is mounted a porcelain socket with a 40-watt bulb with cord and half plug. The table was built of white pine, stained walnut, and finished with shellac and wax. The inside had one coat of flat white and one coat of white enamel. Gliders were applied to the bottom of the legs. The students are very proud of their tracing table and it is in constant use, being moved from classroom to classroom.

To secure the glass in place, strips of Scotch drafting tape may be fastened over each of the corners of the glass, as shown at X, or four countersunk metal clips, like the one shown at Y, may be used.



Tracing table by Rudy Renzius

TWENTIETH ANNUAL MODEL BOAT REGATTA

G. C. HENRIKSEN, SUPERVISOR
Public Schools
Portland, Ore.

Because inquiries have been received from industrial-arts teachers in many parts of the country and because this year marks the twentieth anniversary of the annual model boat regatta in Portland, Ore., it seems fitting that some explanations, descriptions, and details should be presented.

From its inception in the spring of 1927, this annual regatta has now grown to the point where upwards of 500 or more boys and girls enter into sailing and workmanship competition — boats ranging in size from 12 to 36 in. A large number of the 55 elementary school shops participate in this event. Races are held in three different classifications of sizes in sailboats and one classification of power boats. Awards are given for workmanship and speed. Twelve different committees composed of elementary industrial-arts instructors take care of all the details of this event.

Girls are included either by entering sailboats which they themselves have made, or by sponsoring a sailboat made by the boy friend. The affair is generally held on a Saturday and many of the participants bring their lunches and make an all-day affair out of it.

This event also provides an opportunity for the Industrial Arts Association to hold its annual picnic, since the races are held at the West Moreland Casting Pool which is approximately 350 by 410 feet in size, located in one of the city parks of Portland.

Much of the success of the regatta can be credited to the *Oregon Journal*, which through its department of Journal Juniors has furnished publicity and financial support for this undertaking throughout the years. Daniel McDade, director of the Journal Juniors, who is a former industrial-arts man, has contributed much of his time and effort to this annual event.

Keen competition has developed among the various instructors in the designing of boats. Sail area, type of keel, type of sails, sail material, automatic rudder, adjustable masts and the like are all points of divergence in the opinions of the instructors. Submitted herewith are plans for two of the more popular type models which have proved consistent winners in the past. Since this is the twentieth anniversary, it was thought advisable to make some kind of visual record of the event. The co-operation of Amo de Bernardis, supervisor of the Visual Education Department, was solicited and the outcome is a 16mm. colored movie starting with the construction of a boat and winding up with the regatta itself.

A condensed summary of the rules is given as follows:

1. The regatta will be divided into the three following divisions: (1) workmanship, (2) sailboats, (3) motorboats.

2. There will be four classes in workmanship and in sailboats as follows:

Class A — boats 18 in. or under

Class B — boats over 18 in. and up to and including 24 in.

Class C — boats over 24 in. and up to and including 30 in.

Class D — boats over 30 in.

All sizes of motorboats will be grouped in one class, both for racing and for judging in workmanship.

3. Prizes will be awarded in each class for first-, second-, and third-class winners.

4. In the workmanship division, boats will be judged for excellence of workmanship in the following manner:

1. Hull	65 points
2. Sails and rigging	20 points
3. Paint job	15 points

5. In the sailboat division, there will be a contest of sailing ability in each of the four classes. Three heats will be run in class *A* and class *B*. Length of the races will depend on weather conditions and will be determined by the headquarters committee.

6. In the motorboat division, there will be a contest of maintained speed. Motorboats shall be propelled by spring, rubber, electricity, steam, or gas motors. The length of the race will be determined by the headquarters committee.

7. There will be a free-for-all race for sailboats.

8. Every entrant must have built his own boat and must be from the Portland public, private, or parochial schools.

9. Any boy now in high school who built his boat in a Portland grade industrial-arts shop last term (fall of 1945) may, upon getting a signed statement from his grade school instructor, enter the regatta on the same basis as those building their boats in the spring term of 1946. Other high school boys may enter only in the free-for-all race.

10. Each instructor should adopt some system of marking boats, either with banners or sail markings, so that announcers may identify the school from which the boat comes.

The regatta this year was broadcast over station KALE. A transcription was made to broadcast a thirty-minute program giving the high lights of the day's events.

Another feature this year was the inclusion of the Junior Rose Festival celebration which has tied in very nicely both as to the time of the year and the age of the participants.

The regatta is headed by two commodores. One from the *Oregon Journal* and the other the supervisor of industrial arts.

Eight or ten honorary commodores are generally chosen. These include the superintendent of schools, the mayor of the city, the director of city parks, someone from the police bureau, and other interested persons.

The busiest committee is known as the headquarters committee generally consisting of three industrial-arts instructors elected by the industrial-arts association. This committee in turn appoints all the other committees making sure that no industrial-arts teacher is left out. The committees and their duties are as follows:

Workmanship Judging Committee

This committee is responsible for segregating the workmanship entries. A separate judge is chosen for each class of sailboat and motorboat.

Registration Committee

This committee registers all boats entered in the regatta. There is one registration for each class of boat. This committee is responsible for seeing that no commercial boats, or boats not built by boys entering the regatta, are permitted to be registered.

Starting Committee

This committee checks on the eligibility for each of the races and is responsible for the boats starting off in unison.

Landing Committee

This group determines the winners of each race and escorts them first to the record keeper, and then to the microphone for an interview.

All-Out Committee

In order to speed up the races, all boats

Fig. 1. Some of the regatta entrants

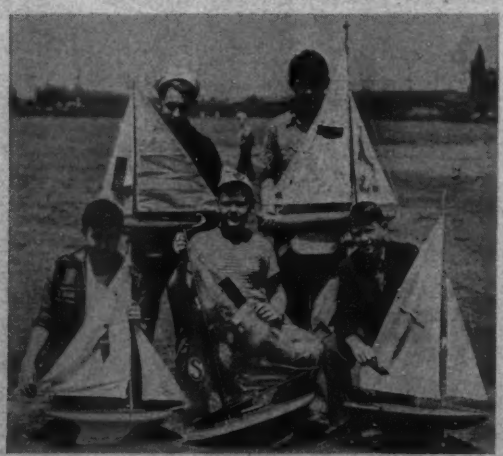


Fig. 2. The winners

are cleaned out of the pool as soon as the third-place winner has been determined. The All-Out Committee takes care of this detail by providing three or four rowboats, but preferably with outboard motor, whose duty it is to pick up the boats and return them to shore as expeditiously as possible.

Other important committees are: radio broadcast, moving picture, rose festival, and program committee.

The general plan and area of the pool is shown in Figure 3.

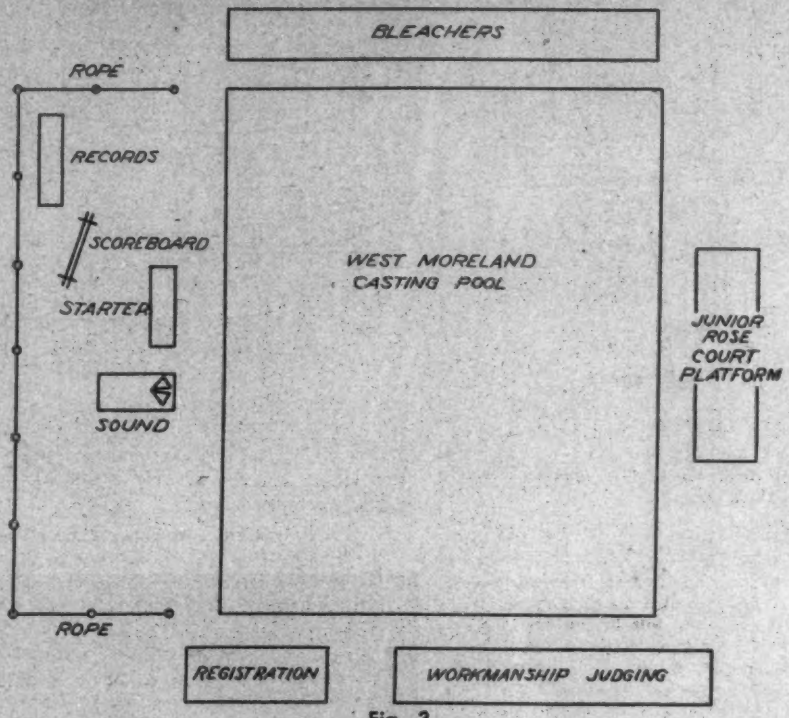


Fig. 3

Evaluation:

The objectives of such a regatta are in common with the following objectives ordinarily thought of in a good industrial-arts program:

1. Developing the ability to use a large

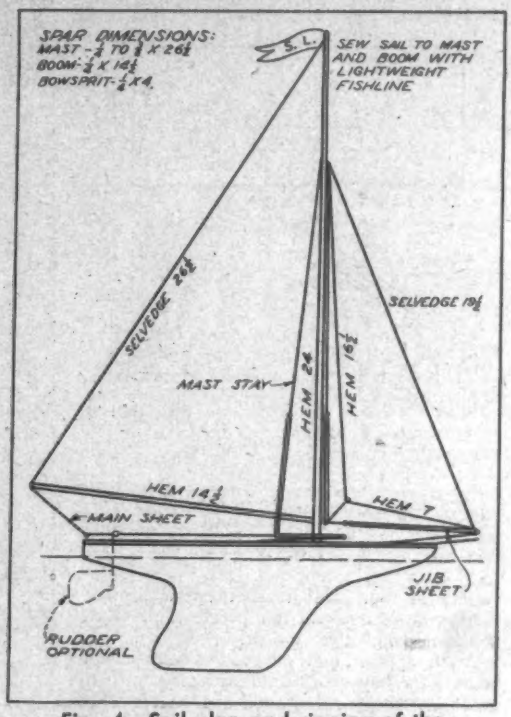


Fig. 4. Sail plan and rigging of the Sandra Lee

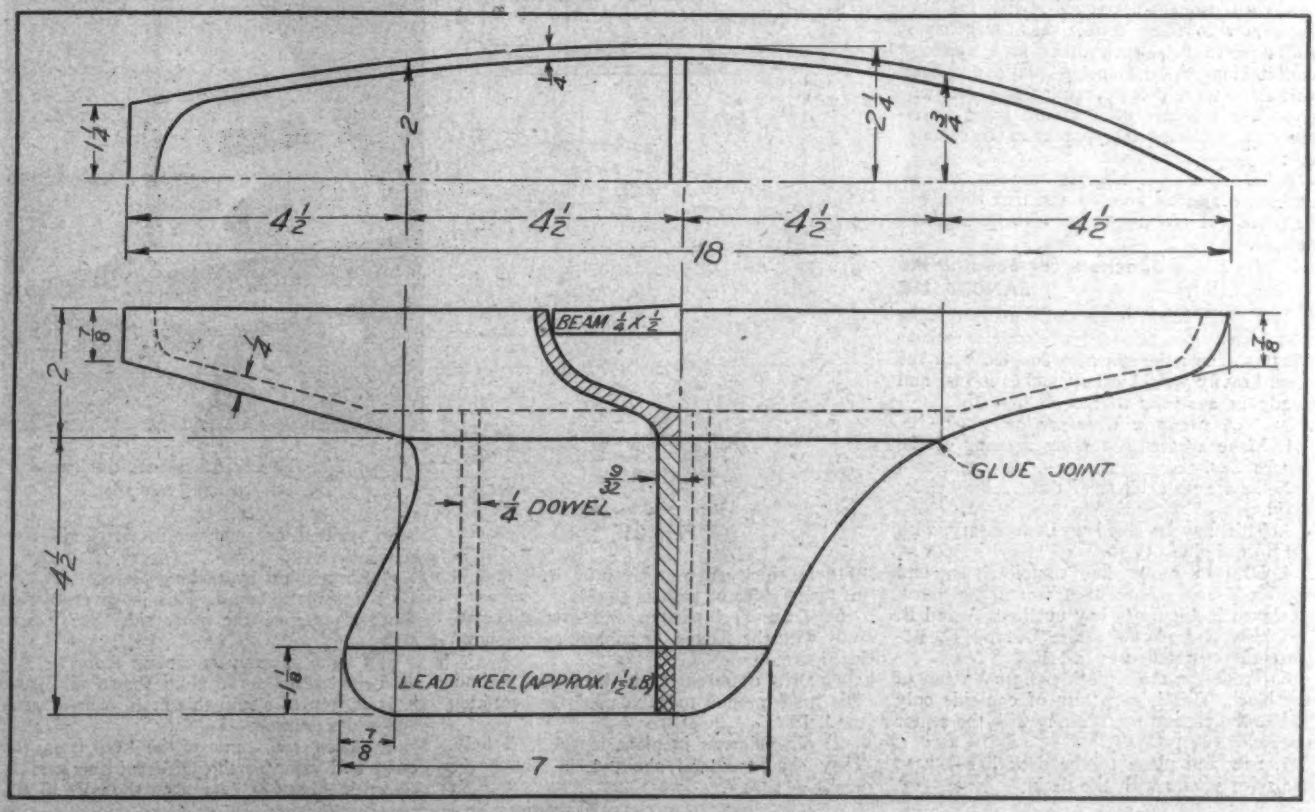


Fig. 5. Deck and profile of the Sandra Lee

Fig. 6

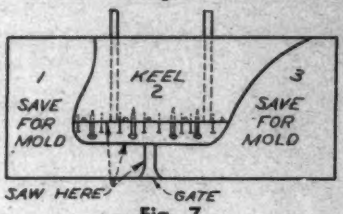


Fig. 7

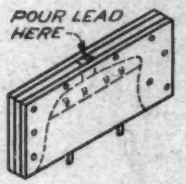


Fig. 8

Fig. 10

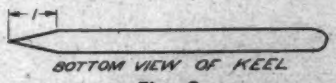


Fig. 9

Fig. 11

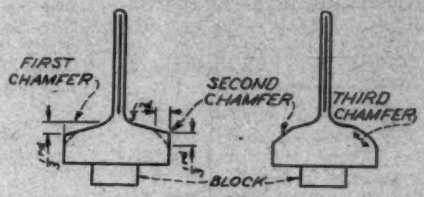


Fig. 12

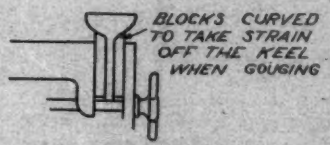


Fig. 13

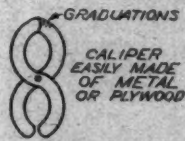


Fig. 14

Fig. 17

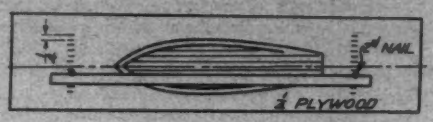


Fig. 15

Fig. 16

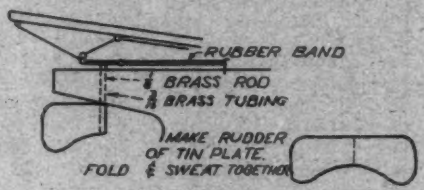


Fig. 18

Fig. 19

variety of tools. One teacher estimated that there were 29 different tool processes involved in the making of a sailboat.

2. An appreciation of good workmanship, because the boys work simultaneously on their sailboats. They are afforded a good opportunity to compare their work with that of others.

3. Citizenship is developed in that the boys learn how to share tools, ideas, suggestions, and how to help each other in a common undertaking. Sportsmanship plays no small part since these races become highly competitive. The teachers of Portland have placed much emphasis on the sportsmanlike conduct of the boys and girls.

It is hoped that aircraft contests will be developed as time goes on and that these will be conducted in conjunction with the sailboat regatta.

Directions for Building the SANDRA LEE

This 18-in. sloop is an easily made reliable model that has placed repeatedly in recent regattas. The large sail area coupled with the deep, heavily weighted keel makes it fast and steady in a strong breeze.

Steps in Construction

1. Make a careful working drawing of the *Sandra Lee.*

2. Square up a block of pine, 2 by 4¾ by 18 in.

3. This may be glued up if necessary, with waterproof glue.

4. Draw a center line completely around the block and square lines around the block as shown in Figure 6. Lay out lines A and B.

5. Saw and plane to lines A and B. Replace the center line.

6. Trace the metal deck pattern on top of the block. This is a pattern of one side only so line the pattern up carefully with the center line.

7. Saw and plane to the deck line — keep the sides square with the deck.

8. Construct the keel.

a) Square up a block of wood exactly 9/16 in. thick and roughly 6 in. wide and 14 in. long (alder or gum is good).

b) Trace keel pattern and saw out carefully with the jig saw or coping saw as shown in Figure 7.

c) Drill dowel holes in keel and in hull. The brad method may be used for centering the holes.

d) Glue dowels in place in the keel only. They should extend about 1 in. above the keel.

e) Place several screws and brads in the bottom of the keel to hold the lead. Small holes, drilled or punched in here will also help.

f) Form mold by tacking pieces 1, 2, and 3 on a smooth board. This is covered with another piece on the other side. See Figure 8.

g) Clamp securely and pour about 1½ lb. of melted lead in the mold shown in Figure 8. It is well to clamp this mold over a sandbox while pouring.

h) When cool remove the keel from the mold and chamfer the edges of the keel as shown in Figure 9. Clamp on the edge of the bench and plane. Finish very smoothly with sandpaper.

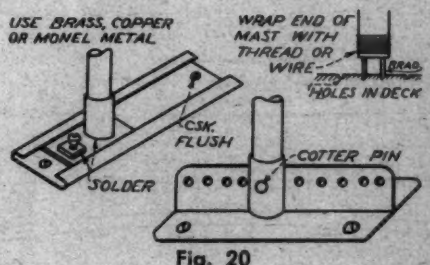


Fig. 20

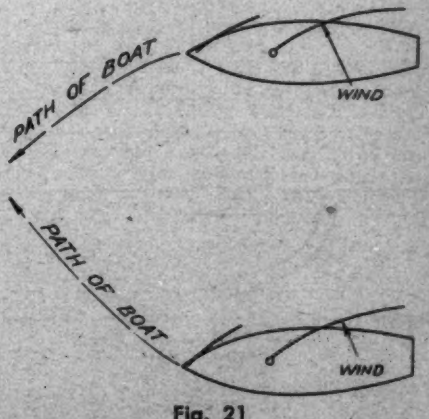


Fig. 21

Fig. 22. The Sandra Lee, designed by Lawrence Lovegren

9. Glue keel in place using waterproof glue. *Caution:* Do not strike lead with a hammer or mallet as it will pull away from the wood, but force in place with vise or a hand screw clamp. Check for squareness.

10. Gouge the curve on each side of the keel as shown in the sketch. See Figure 12.

11. Sketch on the first chamfer and plane to the line from the bottom of the curve just cut. A block nailed or screwed to the deck side of the hull, as shown in Figure 13, will assist in holding the boat in the vise.

12. The second chamfer is sketched from the edges thus formed as shown in Figure 12.

13. The third chamfer consists of rounding off the corners formed by the second chamfer.

14. Additional refinements of the shape, especially where the keel joins the hull, fore and aft, should now be made with a gouge.

15. Sand with No. 1 garnet paper.

16. Gouge out the inside of the hull, leaving the thickness of the hull ¼ in.

17. Sand the inside of the hull.

18. Shape, fit, and glue the deck beam in place.

19. Trace hull on stock for deck and saw out oversize. Mahogany, gum, or pine makes a good deck. Waterproof plywood, ⅛ in. thick, may be used.

20. Gauge and plane to thickness, ⅛ in.

21. Tack temporarily in place with ¾-in. brads and plane to fit.

22. Remove deck, sand carefully, and line. The marking gauge should be used for the outside lines. A jog as shown in Figure 15 is helpful in lining the straight planks. Use a hardwood or metal straightedge and the back edge of a chip-carving knife. Work from the center line out, both ways.

23. Glue a mast support block to the underside of the deck as shown in Figure 16.

24. Coat underside of deck and inside of hull with two coats of varnish.

25. Nail and glue deck in place. Be sure to use waterproof glue.

26. Set nails, fill and putty deck.

27. Make mast, boom, and bowsprit from the same material as the deck, or spruce or maple may be used.

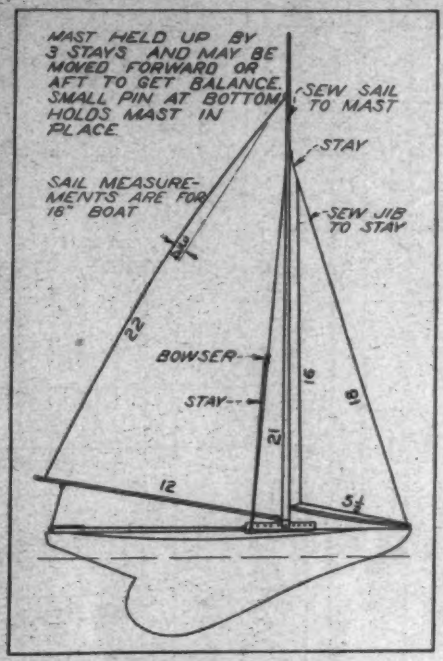


Fig. 23. Sail plan for Porty

28. Wrap ends of boom and bowsprit with thread, as shown in Figure 17.

29. Drill and fasten bowsprit with screws or brads.

30. Place screw eyes in deck and spars. The mast and boom are fastened together with two screw eyes, one looped into the other.

31. Give deck and spars two or three coats of varnish.

32. The rudder is optional; however, the boats are usually steadier when equipped with rudders. See Figure 18.

33. Finish hull as follows:

a) Paint hull with one coat of white undercoater.

b) Paint hull with two coats of white enamel.

c) Locate water line by floating in a tank. Parting dust sprinkled on the water before floating will mark the water line when boat is removed from water.

d) Mask down to the line and paint the underwater surface with two coats of enamel.

e) Smooth with 6/0 wet-or-dry garnet paper and oil.

f) Rub with pumice stone and oil.

g) Wax — this is supposed to give added speed.

34. Construct stand. This can be carried on while enamel is drying.

35. Construct bowsers by sawing slices off a toothbrush handle about ⅛ in. thick. Drill three holes in each piece with a brad and sand them smoothly. See Figure 19.

36. Construct one of the three sliding mast arrangements shown in Figure 20.

37. Make paper sail patterns allowing ¼ in. for hem.

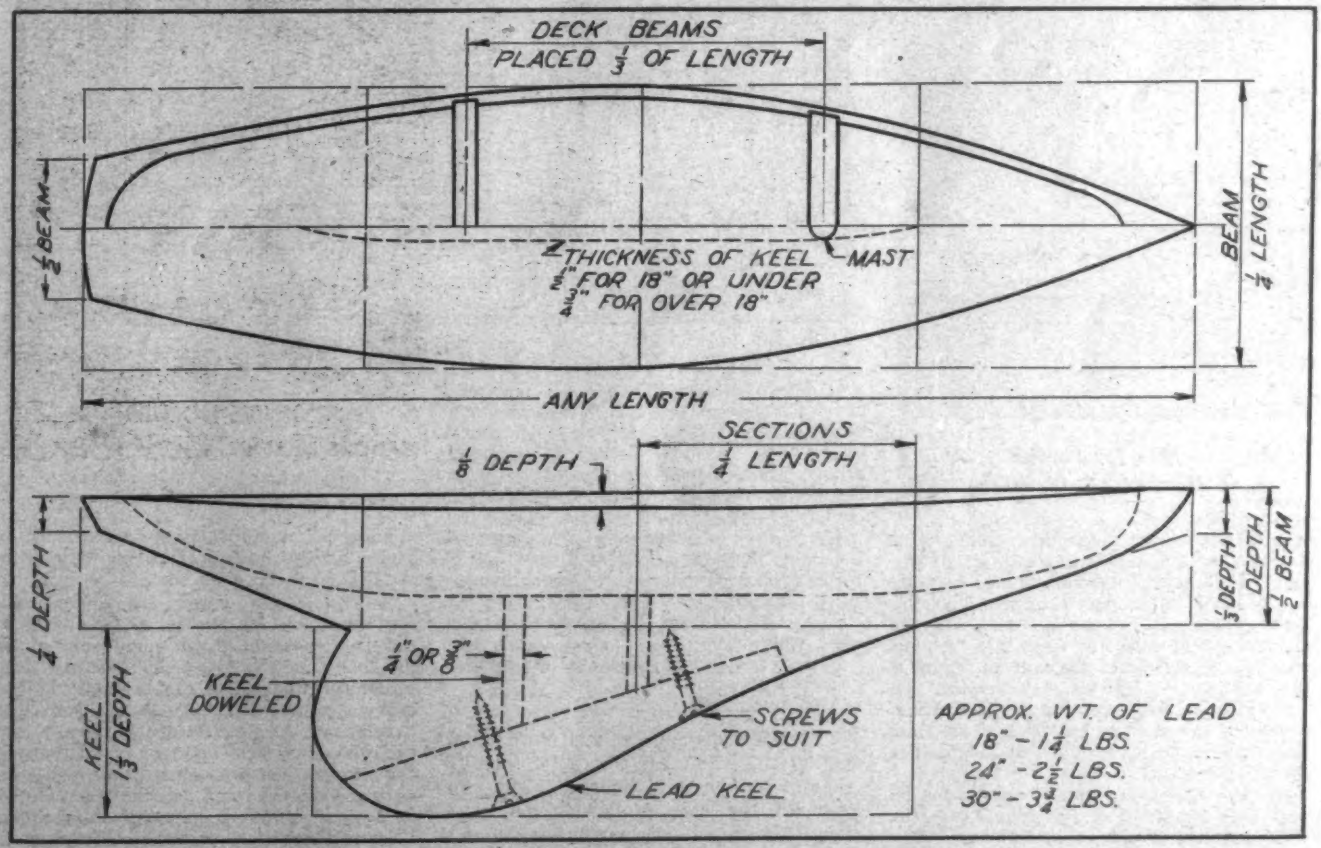


Fig. 24

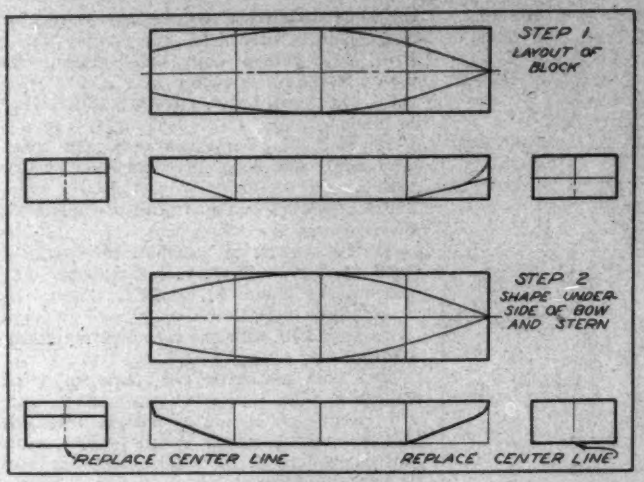


Fig. 25

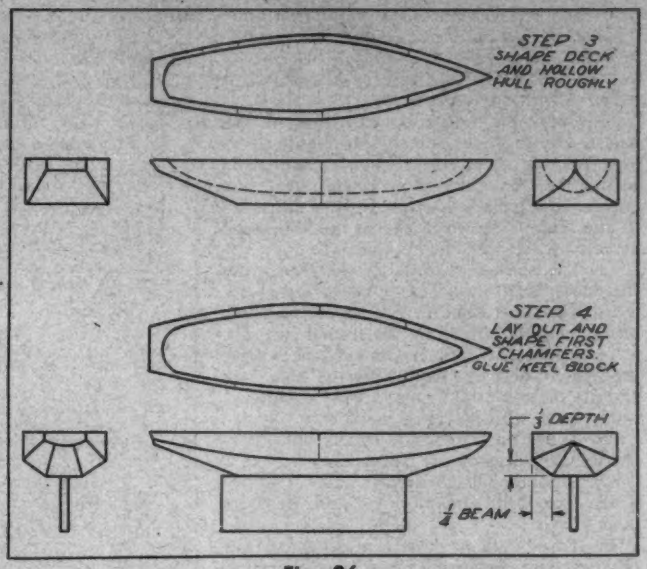


Fig. 26

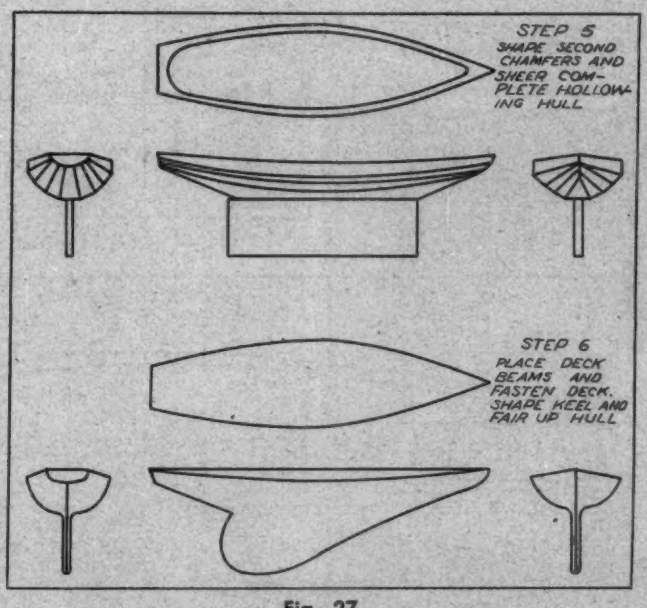


Fig. 27

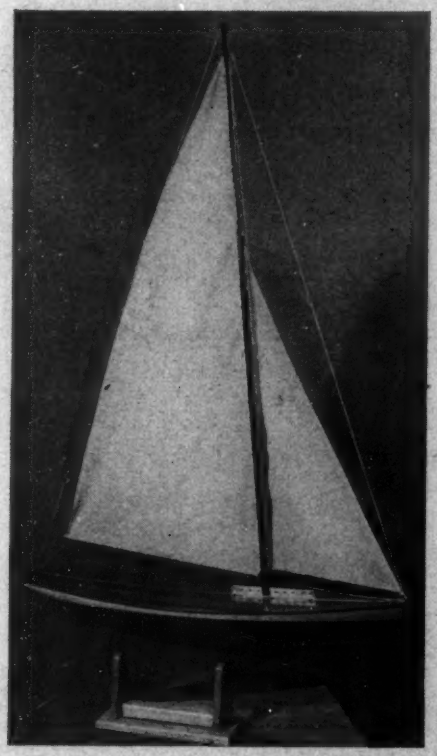


Fig. 28. Porty of Portland, Ore., designed by C. G. Butler

38. Make sails of long cloth or other high quality muslin, or use good grades of cambric or oiled silk. A plastic impregnated cloth is now available and is very satisfactory. Model making supply houses stock a fine grade of material called sailcloth. Keep the selvaged edge on the outside of the sails as shown in the drawing.

39. Rig the boat as shown in the drawing. If desired two stays on each side of the mast may be used, but be careful that they do not impede the action of either sail.

40. Decorate with banners, paint name on hull, stencil a design on the sails (use textile paint), add hatch or cabin, pulleys, turnbuckles, and any other details desired.

41. Practice sailing the boat. For most sailing which is *on a reach* or having the wind from the side, best results are obtained by letting both jib and mainsail out about 45 degrees from the center line of the hull. For sailing with the wind the sails should be let farther out.

42. Adjust the sliding mast. See Figure 21.

Case 1. Boat turns into wind.

Remedy: Sail combination too far back — move forward.

Case 2. Boat turns in the same direction wind is blowing.

Remedy: Sail combination too far forward — move backward.

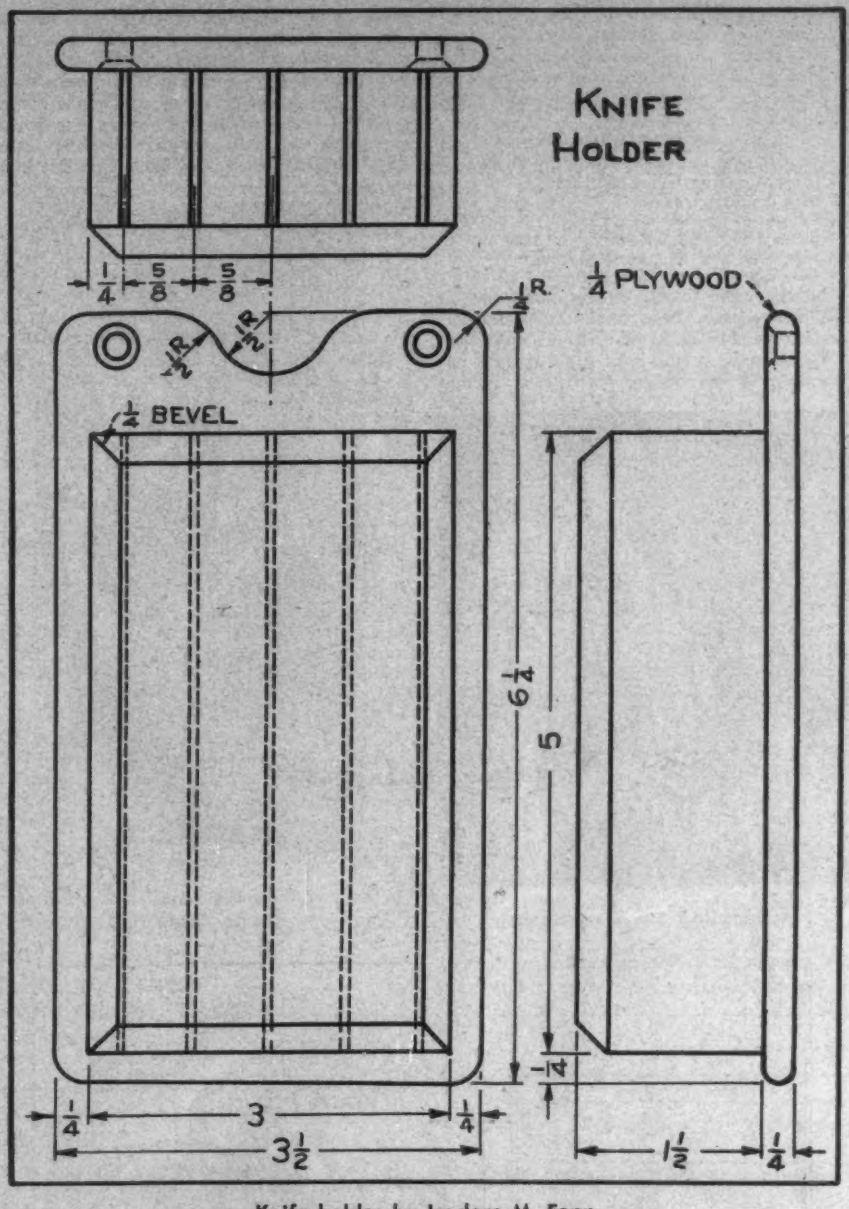
The safest distance at which to follow another car is one car length for each 10 miles of speed. At 30 miles an hour, for example, the safe "following" distance would be three car lengths. — *National Safety Council.*

KNIFE HOLDER

ISADORE M. FENN
Chicago Vocational School
Chicago, Ill.

This five knife, easy-to-construct knife holder can be made in a short while with material from the scrap box.

Only two pieces of wood are required, and very few tools are needed. Shape the back and the holder to the required size. Mark the holder for the saw cuts. These saw cuts for holding the knives can be made with a backsaw, or the piece may be run through a circular saw. As a matter of fact, this project presents an excellent opportunity for the students to get their first experience in using the circular saw. Glue and nail the front to the back as shown in the illustration. Bore two holes in the back. The knife holder may be finished to match the kitchen wall.



Knife holder by Isadore M. Fenn

HEAT EXHAUSTION OF INDUSTRIAL WORKERS

DR. WALDEMAR SCHWEISHEIMER
Lowell, Mass.

How to Keep Cool on Hot Days

There is a big difference whether a man is working in Arizona or New York or Toronto during the summer.

The workingman's chance of escaping sunstroke and heat prostration hinges greatly on what part of the country he lives in. In southern regions he is 28 times more likely to fall a victim to it than in northern regions. We know from statistics that men are three times more susceptible to heat stroke than women — and contrary to popular belief, Negroes are much more susceptible than white people — two to six times more so. A colored worker, therefore, may suffer where a white worker gets along very well.

A recent study of a group of deaths of men, ages 15 to 64, from effects of heat, has shown that over 40 per cent of these deaths were occupational in character. Working in a city is more dangerous than in rural districts in times of a heat spell. Worst period of the day is between 2 and 5 o'clock in the afternoon; second largest number of heat prostrations occur between 7 and 10 o'clock at night. Working inside a house may be more harmful than working outdoors, even in the sun. Indoor temperatures may continue high in spite of a drop in external temperature.

Salt and Perspiration

Profuse sweating takes large amounts of salt from the body. Salt water will prove refreshing in a concentration of 0.1 per cent or a level teaspoonful of salt to a quart of water, or a 15-grain salt tablet with a glass of water. This will replace the salt lost by perspiration.

Secretion of sweat forms part of the heat-regulating mechanism of the body. Sweat is a weak solution of sodium chloride in water with traces of other salts. In hot climates the daily secretion may amount to 3000 c.c. daily and in very torrid atmospheres it may be as much as 10 liters. This makes imperative the drinking of an equal quantity of fluid in order to maintain the normal water content of the body.

The old problem of heat stroke in the army is frequently reduced to three points by experts; water, salt, and clothing. Army authorities in India, in the Middle East, and other desert regions issue extra-salt rations to the troops as prevention against any possible effects of heat. Adequate water is, of course, as important and more important than salt intake. Men should drink as much water as they want, and preferably more. Extra salt should not be consumed during work (British Army), but at meals or in rest periods, especially at night.

Experience With Industrial Workers

Effects of sodium chloride intake on the work performance of man during exposure to dry heat and experimental heat exhaustion was studied recently by Taylor, Henschel, Mikelsen, and Keys (*Amer. Journal of Physiology*). The salt intakes of *normal* men at work and rest during exposure to hot, dry conditions were, in grams NaCl per 24 hours, 6 gm. (low intake), 15 gm. (moderate intake), and 30 g.m. (high intake). Water was allowed freely. Periods in the heat ranged from 2 to 8 days.

Men on low salt intake had higher pulse rates and temperatures at work than men on moderate salt intake. The heart worked poorer in men with low salt intake. Those men lost more than twice as much body weight, drank less water, and sweated less than the men on the moderate salt intake. Heat exhaustion and prostration, characterized by nausea, vomiting, fast heart beat, low blood pressure, dizziness, and collapse, occurred in 25 per cent of the men on the low salt intake and in only 2.5 per cent of the men on moderate salt intake.

Rest, food (with salt), and water sufficed to restore all men so that they could continue to work in the heat in 8 to 24 hours. Taylor and his associates concluded that heat exhaustion and ability to work in the heat are almost wholly dependent on function of heart and blood vessels; moderate salt intake is more important to preserve this function than to prevent heat cramps. The NaCl requirement of unacclimatized men who are sweating 5 to 8 liters a day is not greater than 13 to 17 grams daily. An increase in salt intake above this level has no advantage.

A. R. Smith, in New York State Industrial Bulletin, points out that replacement of salt lost in sweat can be done by use of salt tablets or by addition of salt to drinking water in a concentration of 0.1 per cent. Local cooling has given favorable results by either a blast of air directed over workers or introduction of cooler air inside loose fitting coveralls. Diet must be good in hot weather, and there is some reason to believe that Vitamin C is helpful in offsetting the fatiguing effects of hot weather. Bock and Dill in their investigation of the causes of heat exhaustion at Boulder Dam found losses of sweat amounting to as much as 20 pounds in a seven-hour period.

Collings, Shoudy, and Shaffer, in industrial medicine, reported on more than 400 cases of heat disease. Salt and dextrose given together seem to be more efficient in the prevention than salt alone. Oral administration

of salt and dextrose will suffice in all but the most severe cases. The intravenous method of administration is rarely necessary. Rest in bed is most important. Those workers, who took even small amounts of salt as a preventive, lost, on the average, only half as much time from work as did those who took no salt tablets at all.

Heart and Heat

Some people suffer more from hot days and heat waves while other workers can stand them well. Most sudden heat deaths are heart deaths. Of course, those are well off who have a chance to work in an air-cooled room. A drastic change in temperature is of no avail. Twenty degrees below outside temperature are pleasant and there is no danger of catching cold. The cool atmosphere of the room and the resulting cool poise of everyone working in this room are good for the nerves of the workers concerned as well as for their hearts.

So far only the smaller number of houses, offices, and shops are air cooled in summer, and the average worker has to rely on approved methods of keeping cool on a hot summer day. Some people feel refreshed after a hot bath on a warm day, followed by a hot drink: tea or lemonade. This sounds strange, but the warm bath opens the pores of the skin, enabling the body to throw off heat rapidly. The drink aids perspiration flow.

This method is not to everybody's taste. Many prefer cold showers and cold baths and iced drinks. Alcoholic drinks are best avoided during the day. They produce more body heat and increase heat suffering. Tea, both cold and iced, is a good thirst quencher.

Light, easily digested food will help to keep the body temperature down. Fruits, vegetables, and salads are particularly appropriate on hot days and only little fat and sugar should be taken. The most suitable are cold fruit juices and ice sherbets.

Light colors are preferable for clothing. White material keeps out the warm rays of the sun, the next best being a pale yellow. Putting the capacity of heat absorption for white at 100, we have 102 for pale yellow, 150 for light gray, 168 red, 198 light brown, and 208 for black. Holding the wrists under running cold water is very refreshing. A draught of air may be obtained by opening opposite doors and windows, or by electric fans. If you are thirsty, drink — there is no problem about that.

To avoid discomfort from heat keep placid. If you must quarrel or get upset — winter is the time for it. Any excitement speeds up the circulation and produces heat. Work helps in overcoming the unpleasant feeling of heat to great extent. Interesting work distracts the thoughts — and the more we forget about the heat the easier it is to put up with it with a smile.

PRESSDWOOD WASTEBASKET

SIMON S. PALESTRANT
Bronx, New York City

The war economy revealed a great many ways in which different materials, techniques, and devices could be used. The Pressdwood group played a very important part in our war production.

Its first cousin — quarter board, which is more loosely compressed — has found many civilian outlets. This material comes in sheets of 1/16, ⅛, ¼, ⅜, and ½-in. thickness. It is 4 ft. wide and can be obtained in lengths of 6, 8, 10, 12, and 14 ft. These boards lend themselves excellently to rapid construction and are economical both in time and money.

A very useful and efficient wastebasket can be constructed out of quarter board with the addition of a few feet of cove molding. This is what you would need for a very useful wastebasket.

BILL OF MATERIAL

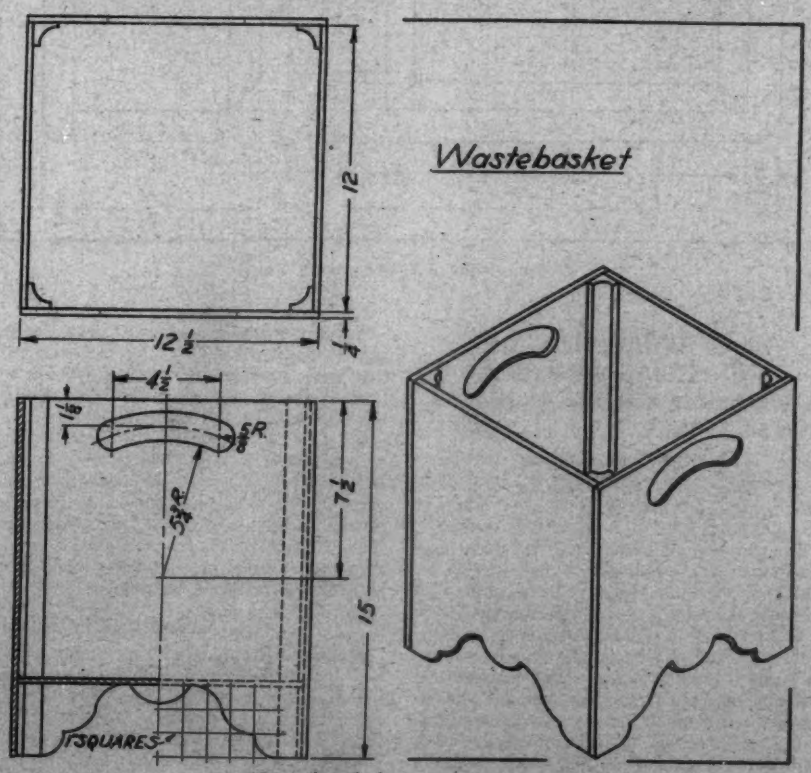
2 sides of quarter board ¼ by 12 by 15 in.
1 front of quarter board ¼ by 12½ by 15 in.
1 back of quarter board ¼ by 12½ by 15 in.
1 bottom of quarter board ¼ by 11½ by 12 in.
4 pieces 1-in. cove molding 12 in. long
4 legs 1-in. cove molding 3 in. long
4 slide domes ¼ in. diameter

Cut the parts to size on a circular saw, if that is available. Then trace the pattern of the bottom and the handle cutouts onto each of the sides, front, and back. Jig-saw them out according to the design. Cut out a bottom piece as per the stock bill. Do the same for the cove molding.

Glue alone will accomplish an effective joint if a good quality of hide or fish glue is used. With the aid of clamps, attach the larger pieces of the molding flush with the edges of the sides, two to each piece. When the glue on these pieces has dried hard, glue the front

Assembling the wastebasket

The wastebasket and the student who made it



Details of the wastebasket

and the back in place. Make certain that they square up exactly. Turn the basket bottom up and insert the bottom piece, fastening it in place with glue. Be sure that the smooth faces of the sides, front, and back face toward the outside whereas the bottom should face upward. Now glue in the short pieces of the cove molding. They will project slightly. This is to prevent the bottom corners of the quarter board from becoming frayed. The inside ends will act as pillars and support the bottom. Fix a sliding dome to the projecting end of each leg for noiseless movement.

This is optional, but a frame of ½-in. quarter-round molding can be inserted around the edges of the underside of the bottom. It will make the basket dustproof and add greater support and rigidity to the job.

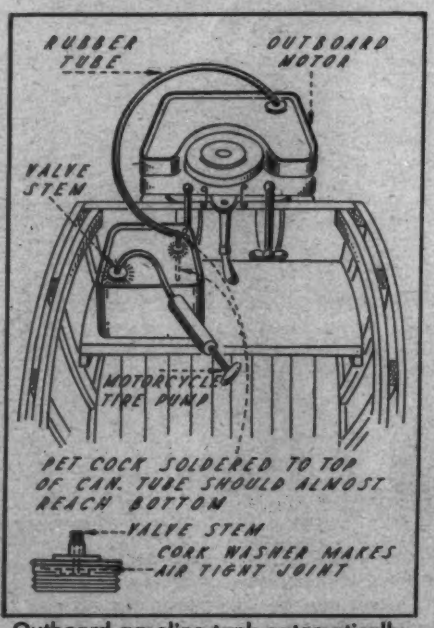
Touch up the joints with some fine sandpaper (No. 2/0) after all excess glue has been washed off.

Since the natural color of this material is a dark tan there is little need to do much with it except to just give it a coat of wax and rub it down. However, if a dark finish is desired then any oil, spirit, or water stain can be applied. After this has dried, the job is ready to be waxed. A coat of white shellac or varnish will darken the tone considerably without the use of any stain as will rubbing it down with linseed or crude oil. If decoration is in order, then a decal or picture transfer may be applied to each of the four faces. The pictorial subject and its exact position is a matter of individual judgment. A border design might be glued around the top, middle, or bottom, by pasting on a carefully selected strip of wallpaper border and then spraying the entire basket — border and all — with a protective layer of clear lacquer. It makes a handsome piece of furniture with any one of these treatments.

OUTBOARD GASOLINE TANK EASILY FILLED

NATHAN BOGOCH
Winnipeg, Manitoba, Canada

Anyone who has had any experience in operating outboard motors is familiar with the annoyance occasioned by the necessity for frequent stops to refill the small capacity fuel tank with gasoline. Danger of fire is great if you attempt to pour in fuel while running. A simple expedient to overcome this difficulty is pictured in the illustration shown herewith. Gasoline is carried in a tin container, to one corner of which a pet cock has been soldered with a tube running down into the liquid. In another corner an ordinary tire valve stem has been placed, with a cork washer to make the connection airtight. Rubber tubing leads from the pet cock to the fuel tank. Air pressure supplied by a tire pump forces the gasoline into the tank.


RUBBER TUBE
OUTBOARD MOTOR
VALVE STEM
MOTORCYCLE TIRE PUMP
PET COCK SOLDERED TO TOP OF CAN. TUBE SHOULD ALMOST REACH BOTTOM
VALVE STEM
CORK WASHER MAKES AIR TIGHT JOINT

Outboard gasoline tank automatically filled

NOVELTY TIE RACK

LOUIS W. SHAPIRO
McKinley High School, Cregier Branch
Chicago, Ill.

The tie-rack shown and described in this article will accommodate all the ties possessed by most boys or men.

This tie rack has proved to be a very good first project at the beginning of the semester. The shop skills involved are: squaring a board, using the backsaw, using the coping saw or jig saw, drilling holes, and finishing.

Each boy creates his own pattern with the limitations of one edge and both ends meeting at square corners. The tie-rack design, the lettering, and the design of the word *ties* is individually drawn.

The dowel rods are fastened in place with glue.

The painting and finishing of the tie rack should be done in one or two days. Show card colors in powder form to be mixed with water or colors already prepared in jars are used by our boys with very good results. These colors are opaque, show up very well, dry quickly, and do not necessitate days of drying, and they eliminate the use of such solvents as turpentine or lacquer thinner. The word *ties* and the background are painted with colors and the remaining part of the tie rack may be stained or left natural.

One or two finishing coats of white shellac rubbed down and finally a coat of rubbing wax will give the project a suitable finish and luster.

BILL OF MATERIAL

No. of pieces	*Name*	*Size*
1	Back	3/16 x 5 x 12 in.
2	Brackets	½ x 2½-in. dowel
1	Bar	¼ x 11½-in. dowel

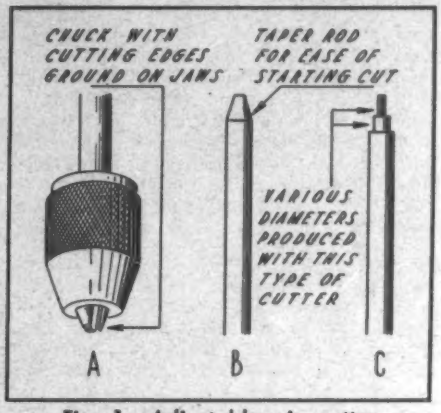
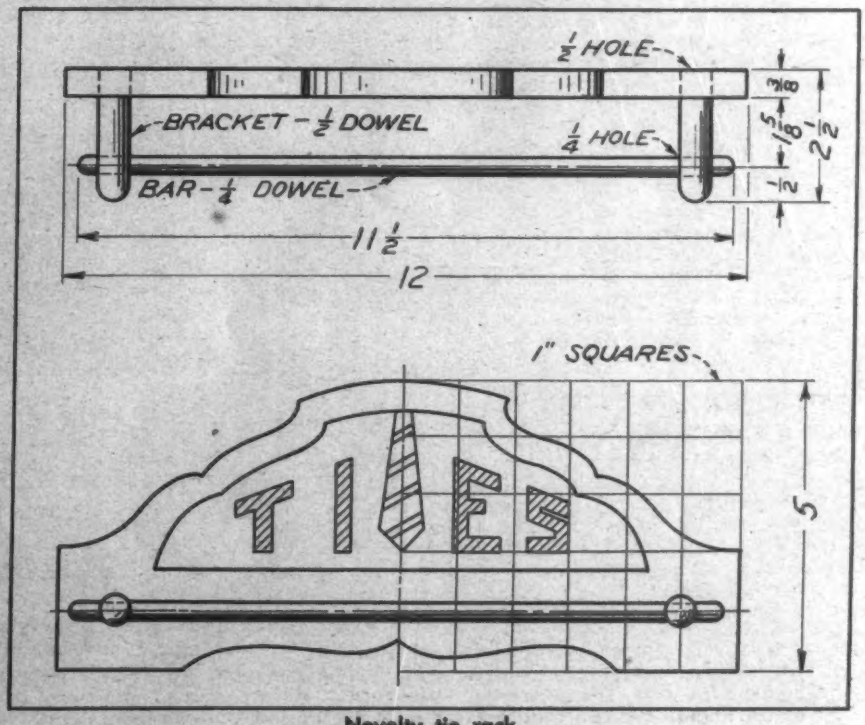

CHUCK WITH CUTTING EDGES GROUND ON JAWS
TAPER ROD FOR EASE OF STARTING CUT
VARIOUS DIAMETERS PRODUCED WITH THIS TYPE OF CUTTER
A
B
C

Fig. 1. Adjustable pin cutter

ADJUSTABLE PIN CUTTER

NATHAN BOGOCH
Winnipeg, Manitoba, Canada

When there is no lathe available for pin cutting, the jaws of an ordinary drill chuck can be ground so as to convert it into an adjustable cutter. It is advisable to grind a taper on the end of the rod on which the reduced diameter is to be cut for the purpose of giving the cutter a good start. See *B* in Figure 1. At *A* is shown the chuck with cutting edges ground on the jaws. At *C* the finished job. The job can be held in a drill vise or disused lathe chuck.



Novelty tie rack

SHOP KINKS — SAWING AND WEDGING

JOHN W. DEAN
Arlington Heights, Ill.

Wedging Boards Together

Every shop instructor has found it necessary at times to clamp boards together for band sawing, jointing, sanding, etc., in order to produce two identical pieces, only to find that the clamps are in the way and much time is lost in shifting them around. So he resorts to nailing the boards together, usually through the waste wood, only to discover that they interfere with some operations which he wants to perform and that they are of no use in holding the pieces upon which he is working. Hence, the following is given as a simple substitute which has several advantages.

First, cut several wedges from firm grained wood about as wide as the two pieces are thick. The thin end of the wedge should be almost as thick as a saw kerf; the other end should be ⅛ to 3/16 in. thick.

Next, mark out the shape you are to cut on the toppiece only. Hold the two pieces firmly together and make two or three saw cuts ½ in. deep into the ends of the parts being worked. The cuts should be made preferably with the band saw. They should be cut into the waste wood at the ends, and trimmed off later on. See Figure 1.

The wedges can be driven into these slits, or removed more easily than nails can be driven into the wood; they can be used repeatedly, and will not do any damage to woodworking machinery. If the boards have a tendency to separate on the wedge they can usually be forced together again to hold until the operation is completed. Sometimes it is necessary to hold two boards that are slightly warped. It is well known that two nails driven in at different slants will hold better than when both are at right angles to the surface. The same holds true with the wedges so the boards should be drawn together in a vise, or with clamps, as shown in Figure 2, and two or more cuts made in the ends with a handsaw. The wedges may then be driven in, the clamps removed, and the various operations done without difficulty.

Cutting Grooves With a Circular Saw

Perhaps you are familiar with this operation but may never have considered its practical uses and possibilities.

It is based on the fact that a circle, seen in perspective, is an ellipse and the narrow end of an ellipse is almost the arc of a small circle. So if we sight across the saw table at a slight angle to the plane of the saw the portion of the saw that we see will be approximately a portion of a circle or a parabola, depending on the angle of sight, the height of the saw, and to some extent, the

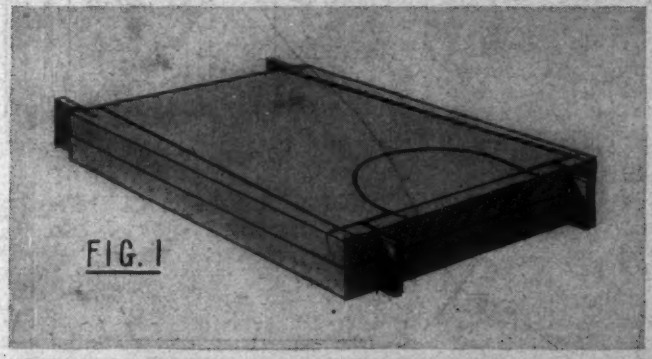


FIG. 1

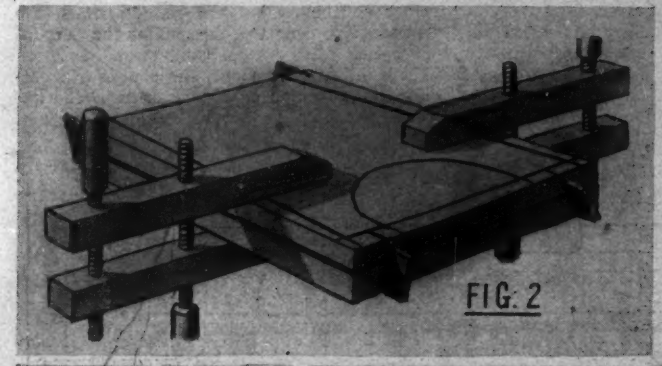


FIG. 2

FIG. 5

FIG. 6

FIG. 8

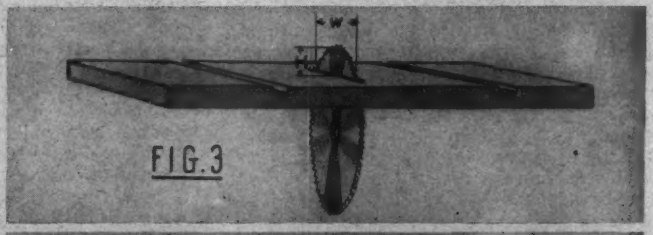


FIG. 3

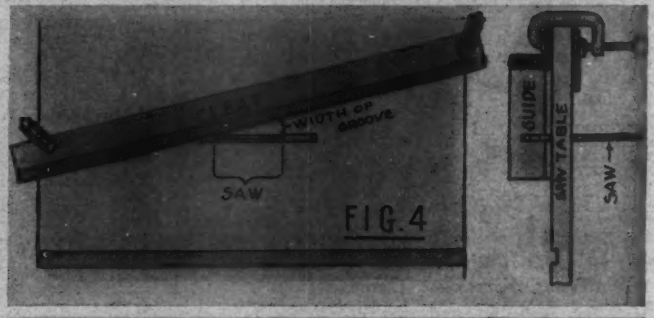


FIG. 4

FIG. 7

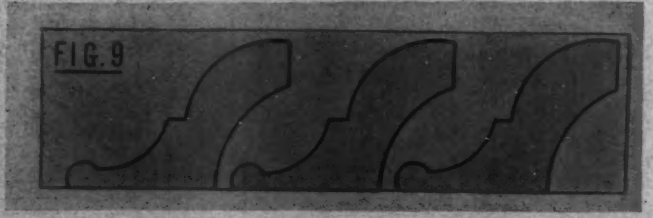


FIG. 9

Fig. 1. Wedges to hold two boards together. Fig. 2. Wedges at an angle to hold boards from separating at the outside edges. Fig. 3. Circular saw seen at an angle above the table. Fig. 4. Top view and side view with the guide at an angle. Fig. 5. Preliminary cutting for wide shallow and deep narrow grooves. Fig. 6. Single-edge cuts. The saw used instead of a shaper. Fig. 7A. Groove across a narrow board. 7B. Grooved at an angle. Fig. 8. Diagram for a center post and three feet. Fig. 9. Layout of the three feet for grooving

diameter of the saw. See Figure 3. Hence, if the board is run over the saw along the line of sight, a curved groove will be cut out.

It is best to experiment a little before attempting a real job or giving a demonstration before a class. First, plan to cut a groove 3/8 in. deep all the way across the edge of a board 1 in. wide. Let us assume that the saw is a heavy one that will not twist out of shape. Instructions will be given later for working with small, thin, saws.

Raise the saw just 3/8 in. above the level of the table. Use a long strip of wood as a guide to be clamped across the saw table at an angle, as shown in Figure 4, and place it on the table so that it will just touch the saw on the far side but will be just 1 in. away on the near side. Check the distance with the end of the board itself. If you plan to use this idea often it is recommended that you make a durable guide of hardwood and nail a cleat onto one edge to simplify clamping. The guide should be long enough to reach across the table at any angle that may ever be used since it must be clamped at both ends. You will probably need to use thin boards underneath the table also. By running the board across the saw alongside the guide slowly, you should be able to cut the groove clean and smooth exactly to the dimensions wanted.

If the saw is so thin that it has a tendency to twist it is advisable to make some preliminary cuts the length of the board, cutting away much of the wood within the arc of the circle drawn on the end of the board, as shown in Figure 5. Of course, this will help much in making a large cut with a heavy saw, or you may set the guide properly and then lower the saw to make a narrower and shallower cut at first. Then raise the saw a little each time you make an additional cut.

Next, plan to make a groove the same depth, 3/8 in., and only 1/2 in. wide. This will necessitate a change in the angle of the guide and also placing it 1/4 in. away from the saw on one side and 3/4 in. on the other. If the contour of the groove is drawn on the end of the board it is possible to check the distances directly from it.

Now plan to cut a groove the same width, 1/2 in., but make it 3/4 in. deep. Just raising the saw to 3/4 in. would widen the groove proportionately so we must change the angle of the guide again to keep the same margins on each side of the groove. Thus we find the rule to be that the narrower and deeper the groove, the nearer to parallel will be the saw and the guide.

Whether to use the cutoff or ripsaw will depend on both the hardness of the wood and the size of the groove. If enough wood has been removed with straight cuts, as shown in Figure 5, you can cut a very wide groove at a great angle to the plane of rotation with the crosscut saw.

The saw may be used instead of a shaper to remove just one edge of a board as shown in Figure 6, on all four sides, as of a small table top. Test on scrap wood to determine which side of the saw will make the smoother cut on the end grain.

If it is necessary to cut a groove across the narrow width of the board at right angles to the length, as shown at *A* in Figure 7, or at some odd angle as at *B* in Figure 7, it may be possible to nail on an extra piece of wood, temporarily, at the proper angle and move the guide sufficiently far away from the saw.

One of the most common uses for this method of grooving is on the inner ends of the three feet of a center-leg table where they must be fitted to the turned bottom of the post. Instead of trying to trim the post to a triangular shape, just draw a diagram as shown in Figure 8, having the circle just the size of the post and the chord just as long as the width of the foot. Carefully measure the depth of the necessary cut, set up the saw and guide, then make a test cut on a scrap of wood of the proper thickness and test this against the post. It should be an exact fit; if it is not the fault is probably with the angle of the guide. The job will be much simpler if you can groove the three pieces at one time as indicated in Figure 9. If they must be cut with the grain for additional strength it is still possible to groove them singly. An additional guide on the other side of the saw, just as far away as the thickness of the foot, will aid in keeping it exactly horizontal and will help to steady it so the straight portion will be kept flat on the saw table.

THIRD DIMENSION SHOP LAYOUT

Gilbert G. Weaver*

The problem of shop layout presents itself whenever new equipment is purchased or old equipment is to be rearranged or moved to a new location. The usual procedure has been to cut out two dimensional templets drawn to scale and representing the floor space required for each machine or piece of equipment. This method has produced semisatisfactory results over a long period of time. However, the lack of a third dimension in the templets has resulted in many errors. The use of these templets requires a considerable amount of imagination to visualize the final arrangement. Invariably many minor factors are overlooked and omissions and interferences are not discovered until they are costly in time and inconvenience.

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Fig. 1. How the models are made

The use of *scale models* removes all the shortcomings of the templet method. The models have not only all the advantages of the templets but have additional assets. The only objection to be presented against the model method is the initial cost, if they are made by a modelmaker. It is possible to have the models made in the school shops and thereby eliminate the original costs.

In addition to the models a layout board or table will be an added advantage. This table should be large enough to represent the maximum floor space probable in a

Fig. 2. Class studying shop layout

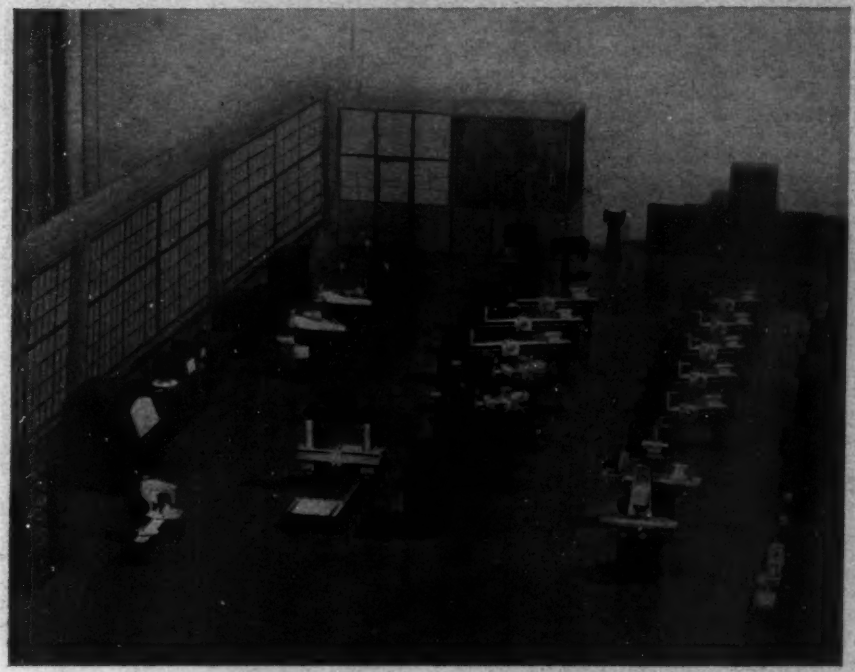

Fig. 3. Models produce a sense of reality

school shop, and be scored with light horizontal and vertical lines spaced according to the scale of the models. If the models are 1 in. to 1 ft., then the scored lines should be 1 in. apart. The same results may be secured by using a blueprint carrying the lines. In the latter case it is possible to trace around the models on the blueprint proper and have a record of the layout.

The following suggestions will be helpful to persons anticipating the use of models for shop planning.

1. Design the models to be readily distinguishable. The special characteristics of each machine should be worked out in sufficient detail to permit recognition by one whose trade experience is limited.

2. Avoid unnecessary detail such as small handles, levers, gears, etc. They add little to the utility but do increase the possible breakage.

3. Do not carry simplicity to the point of distortion as the effectiveness of the models is impaired.

4. Construct models of substantial materials to extend the life of their use. Each model should be of sufficient weight to remain where located.

5. Paint models according to the modern color code recommended by experts. This procedure will give a true picture of the final appearance of the proposed shop.

6. Use mannequins made to scale to determine adequate space for the operators of the machines, as they will prove to be an added advantage. Each mannequin should be mounted on a metal disk about 1½ in. in diameter and ⅛ in. thick for added weight, thus enabling them to remain where placed.

Figure 1 shows a model made to a scale of 1 in. = 1 ft. Although the details of the construction are absent, the machine can be recognized by one slightly familiar with this type of equipment.

Figure 2 shows a class in shop organization using the models in studying woodshop layout.

Figure 3 shows a machine-shop layout in which the models have produced a sense of reality.

This method permits the desirable adjustments and removal of "bugs" before a costly installation is made. It assures adequate areas for assembly, temporary or permanent material storage, aisle space, toolrooms, and teacher's office. This technique is highly recommended to vocational directors and teacher training schools because it gives reality to this important project.

INK DRAWING VIA PHOTOGRAPHY

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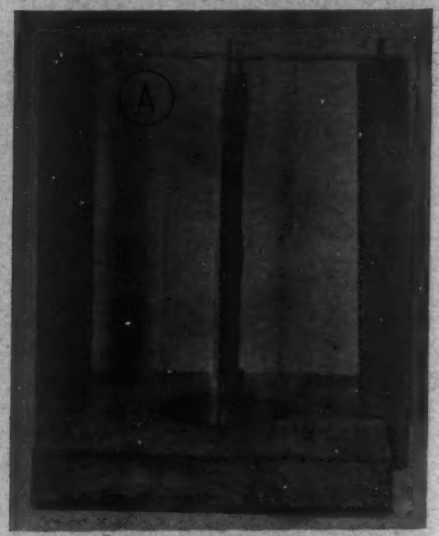
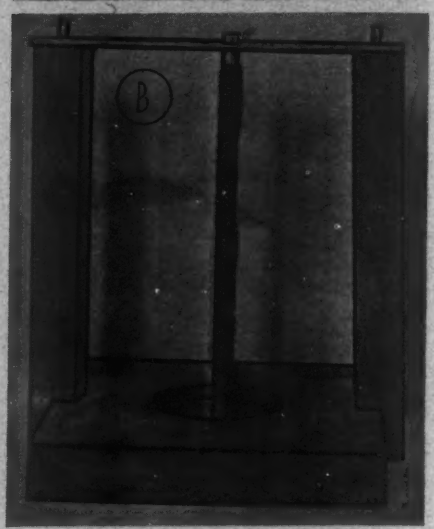
The problem of resolving photographic cuts and prints to the more simple line drawing is a problem which often confronts the industrial-arts teacher. This problem can be easily solved through a combination of photography and ink or pencil drawing.

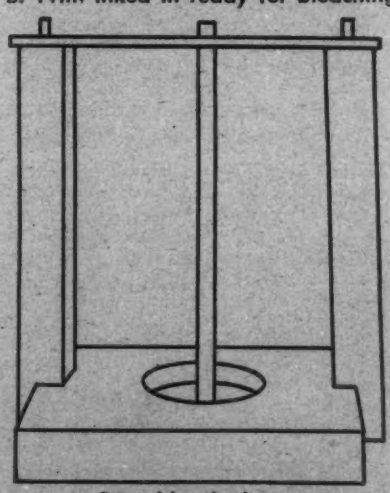
Reproductions of line drawing or conversion of photographs into line drawings can be accomplished by preparing a negative of the object, enlarging it to the size wanted or making a direct full-size print, inking or penciling in the outline, and removing the photographic image by a chemical bleaching process.

The initial print is made on smooth photographic printing paper which should be smooth but not glossy. This may be in the form of an enlargement made from a negative as small as 35mm. Enlargement of the negative permits considerable control over the exact size of the finished drawing. Where the negative is full size a simple contact print on a smooth matt surface paper is all that is needed. The print may then be inked in with





A. Original print
B. Print inked in ready for bleaching



Print bleached out

waterproof drawing ink or with a pencil. When the ink has completely dried the print should be immersed in a solution made of:

10 per cent iodine crystals in denatured alcohol	12 cc.
10 per cent potassium cyanide	2 cc.
Water	100 cc.

In about 30 seconds the silver image should have been bleached out. After washing in running water for about 5 minutes the print may be dried and modified or dimensioned to suit the needs of the teacher.

NOVELTY SEWING KIT

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The novelty sewing kit illustrated and described herewith is made in two sections hinged together and opening out as shown. The advantage of this type of box is that the contents are easily accessible, and when closed, the case takes up very little space.

The sketch of the completed case shows what the compartments are intended to contain. The two compartments, when closed, are held together by two hooks and eyes. The handle on the top permits the case to be easily transported from one place to another. If desired, a colorful plastic handle may be put on the case.

The sides, top, bottom, back and front of the case are made of ⅜-in. wood. All parts are nailed and glued. After the glue is dry the box is cut apart to make the two compartments of the case.

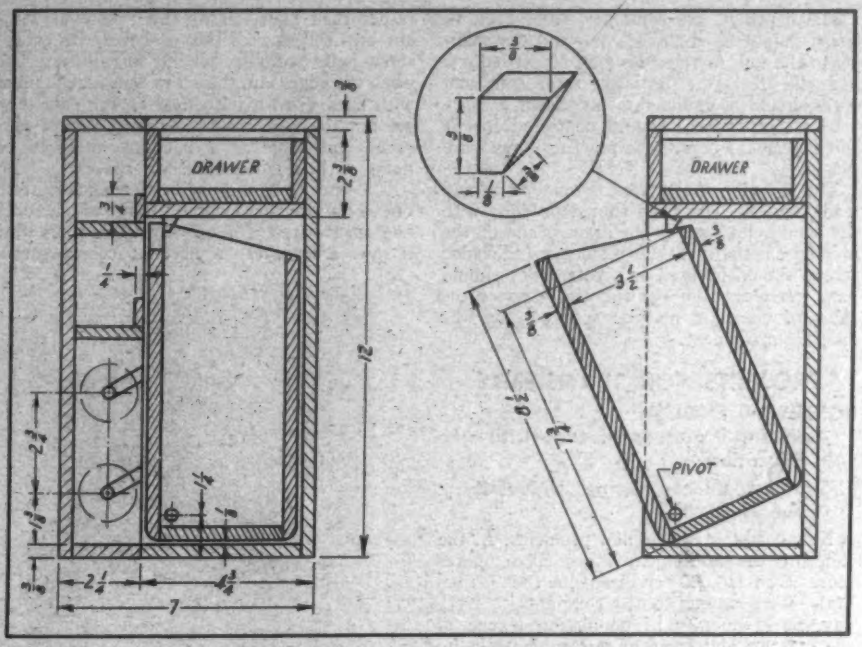

Fig. 1. Section of compartments closed and opened

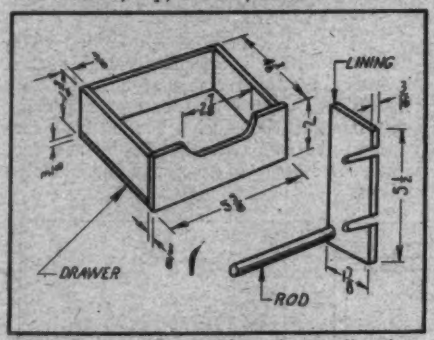

Fig. 3. Drawer and reel spindle slot

The measurements for the division and for the arrangement of the shelving are shown in Figures 1 and 2.

The construction of the drawers is clearly shown in Figure 3. The handhole in the front section is cut out with the fret saw and the edges made smooth with coarse and fine sandpaper.

In this diagram, too, is shown how the racks are made for the spools. The sloping slots are cut out with the fret saw to take the ¼-in. round rods which, of course, must be made removable for the threading on of the spools. The linings may be either glued or screwed into place on the ends of the case.

Before commencing work on the movable compartment mentioned, glance at the sectional diagram shown in Figure 1. Here it will be seen how the container is constructed and how it is pivoted at the front corner to fall forward giving full access to the interior.

The container should be ¼ in. less in width than the opening in the case, to allow free movement when pivoted. Note, too, that the back is 1 in. less in height, so that when thrown forward, it lodges against a stop which has been fixed to the underside of the shelf above.

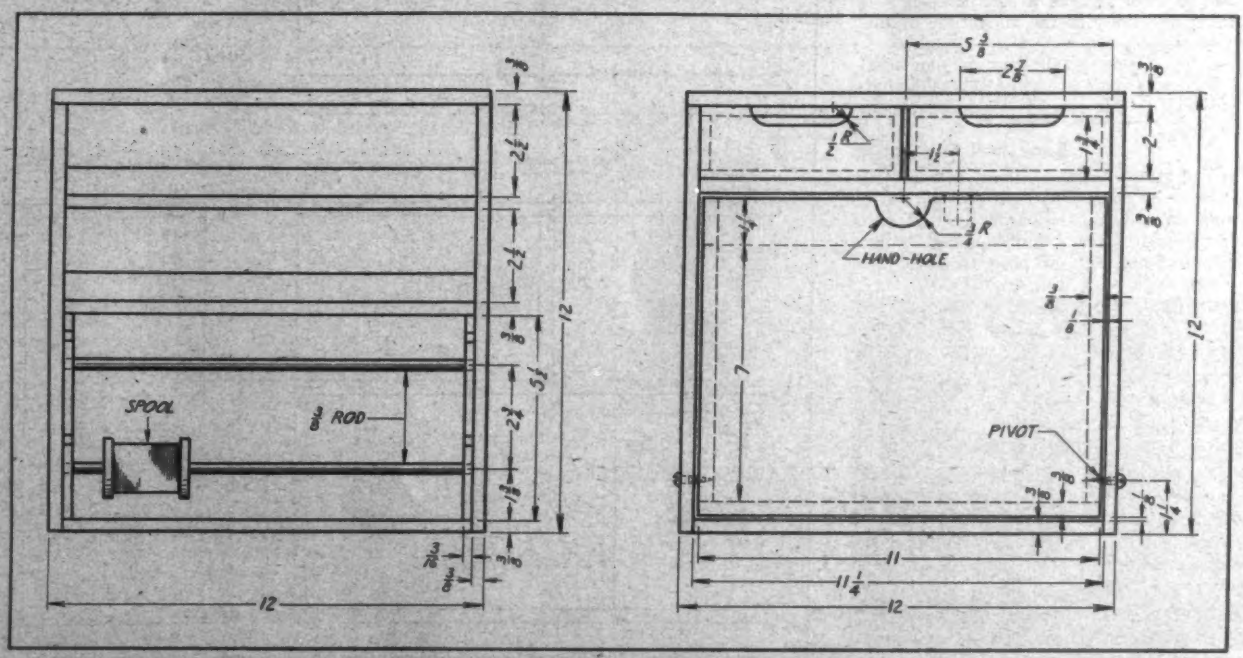

Fig. 2. Front view of two main compartments

The depth of the container, from back to front, should be about 4¼ in., and the shaping to the tops of the sides may be carried out with the fret saw. The lower front and back edges should be rounded off as shown.

The compartment should be tested for fit and movement before the pivoting screws are run in.

The top edge of the front is rounded off and made smooth. The same should be done with the hand holes both on the drawers and on the pivoted compartment. Two stout roundheaded screws should be used as pivots. They should pass freely through the full thickness of the sides of the case and be screwed into the inner compartment.

PROJECTS FOR TRANSIENTS

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Assistant Professor of Industrial Education
Southern Illinois Normal University
Carbondale, Ill.

New conditions bring new problems. At the time of the latest available census figures more than 20,000 civilians in the United States were moving to new communities every day. Such mobility of population is one of the reasons why some of our students in industrial-arts classes "don't know what to make" when given an opportunity to choose a project.

As a recently active member of the armed forces, I had to move my family 5 times in 22 months. As a result of such moving I have some suggestions which can make "transient" living more like home. The unique feature of these suggested furnishings is their adaptability to double usage. They are desirable articles with which *furnished rooms* or apartments are not adequately equipped. They are also of such a nature that they can be used as containers for moving numerous small articles which are desirable in making a *place* a home.

This double function makes the accompanying suggestions of special interest to youth living in temporary quarters. A glance at the *Wanting to Rent* section of any newspaper is screaming testimony of the magnitude of this group of people.

Present shortages of all lumber is an additional factor in favor of shop teachers' including projects of this type in their suggestions to students.

Bookshelf End Table

The end table shown in Figure 1, when laid on its back, becomes a packing box merely by screwing an end to it. Boards screwed onto the front make it ready for shipping. Fastening the end and top in place with screws, rather than nails, allows their removal without any splitting of box or cover. Of course screw holes are objectionable in furniture, but when the edges and the screw holes are stained with dark varnish stain used on the case they are not too noticeable. Certainly, such a versatile end table is a pleasant alternate to doing without adequate shelf space.

Fig. 1. A bookshelf end table

The end table and shelves were made from one heavyweight shipping box which once contained paper. The only available tools were a saw, a hammer, a piece of coarse garnet paper, and a paint brush. No nail holes were filled. When finished, the entire job was finished with one coat of varnish stain.

Fig. 2. The bookshelves serving for another purpose

One apartment which we occupied had adequate bookshelves for our small traveling library, but it lacked table and shelf space in the dining room. The bookshelf end table therefore was made to serve as a dish cupboard and radio table, as shown in Figure 2. When we had moved to this apartment, this piece of furniture, with end and front fastened on, served as a shipping crate for books, music, and clothing.

As a piece of furniture it was cut to size and nailed together in a few hours. It was reconverted into a packing box in just a few minutes. On arrival at our next quarters it was easily and quickly reconverted to a usable item of furniture, and it has gone through this transformation four times by van and freight, and has travel over 4000 miles.

A pair of these bookshelf end tables, made right and left handed, will serve as armrests or as end tables, at the two ends of a studio couch.

Bookshelf Desk Table

The shelved drop-leaf table, shown in Figure 4, embodies elements of the same design. It provides 16 linear feet of shelf space for books and magazines. With ends and front screwed on, it provides 6 cu. ft. of container space for moving.

Sea Chests

An item which is especially valuable when moving is a solid, rectangular box of heavy construction. It may be used for packing many small articles. Such a box needs no conversion to become a sea chest usable as a foot locker for storage of toys and miscellaneous articles.

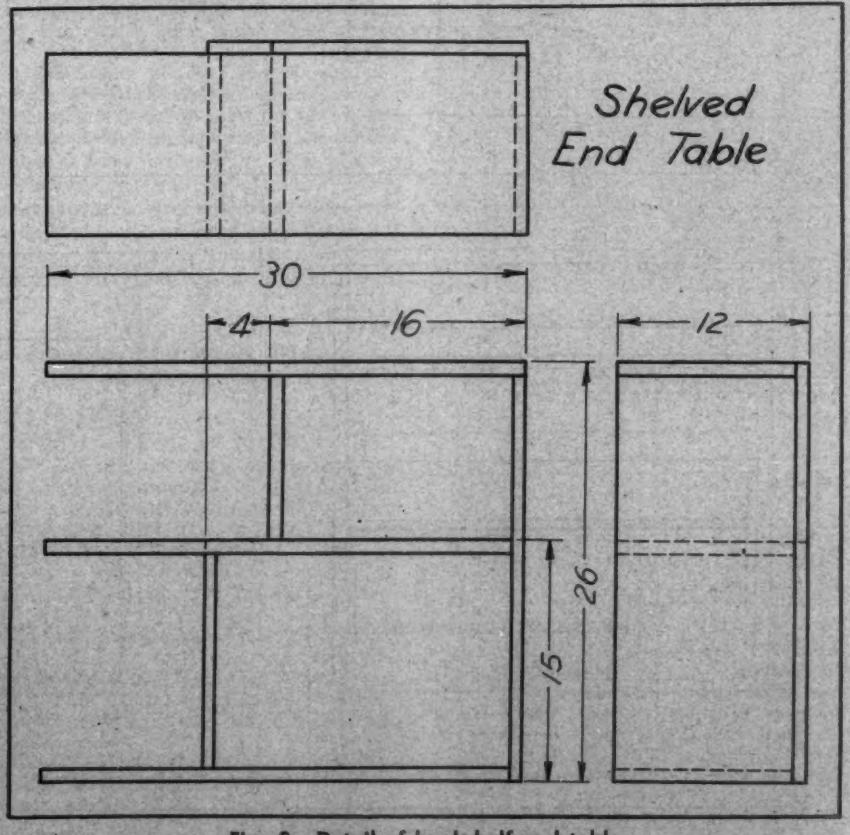


Fig. 3. Detail of bookshelf end table

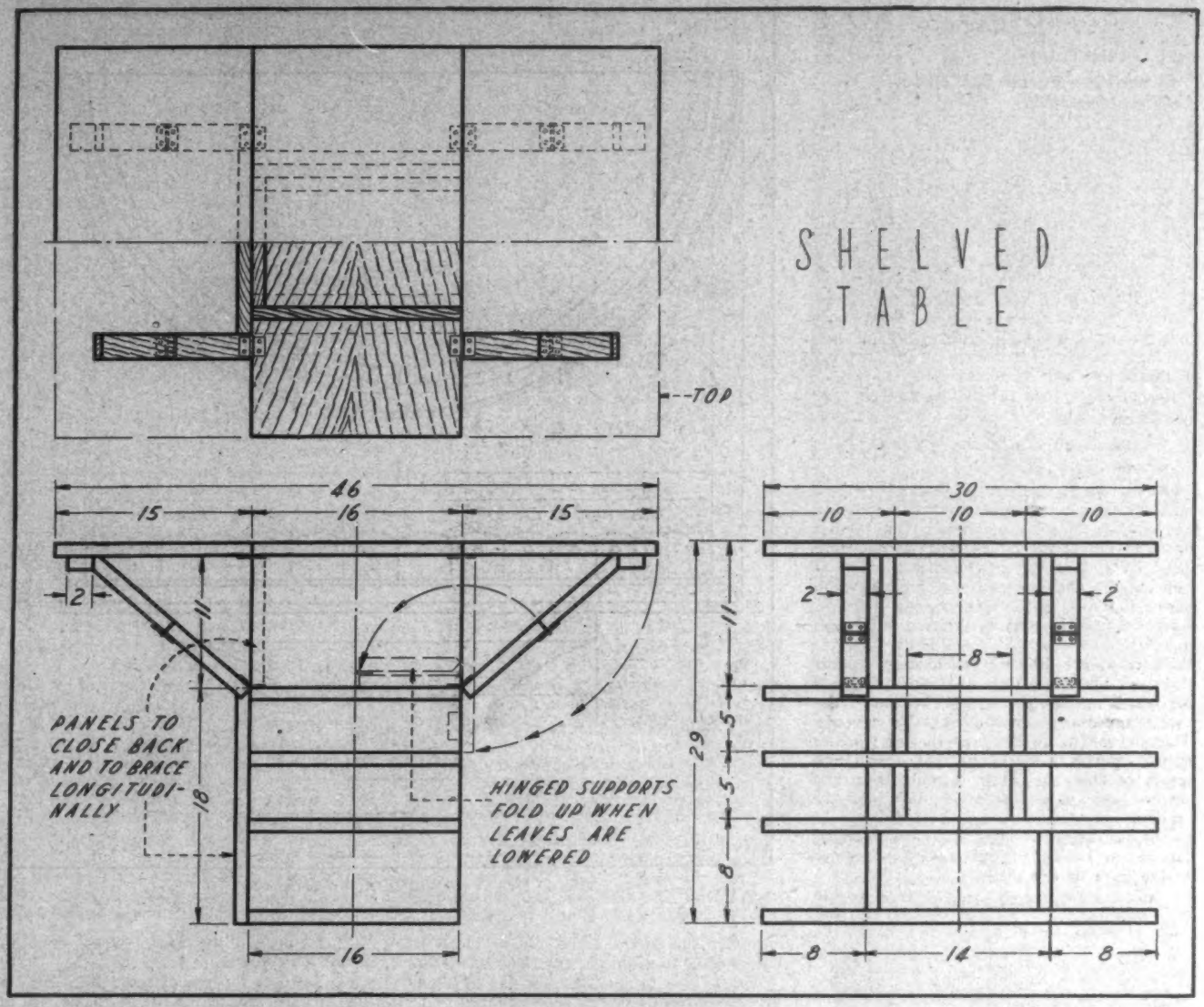


Fig. 4. Bookshelf desk table

The two boxes I made from used lumber (frequently the only kind available) have their tops hinged on. When we moved, the tops were held down securely with three screws and banded with two pieces of steel tape. Upon arrival the screws were removed and the children had their sea chests again. Rope handles add to the appearance of such chests and simplify their handling as heavy packing boxes.

Dimensions are arbitrary and may best be determined by available material.

A half tray is more desirable than a full-length tray as it increases the accessibility of the bottom of the chest.

In the months that we Englishes (Lieut., Mrs., Barbara Jane, aged 7, and Bill, aged 4) were away from home, it was my observation that making one's living quarters homelike paid dividends in satisfaction. Having a few of your own things, such as choice books and functional bric-a-brac, contribute to one's feeling of belonging where he lives — that is, being at home. Packing-case furniture of the types suggested can help make it possible to move such items and will provide a place to keep them.

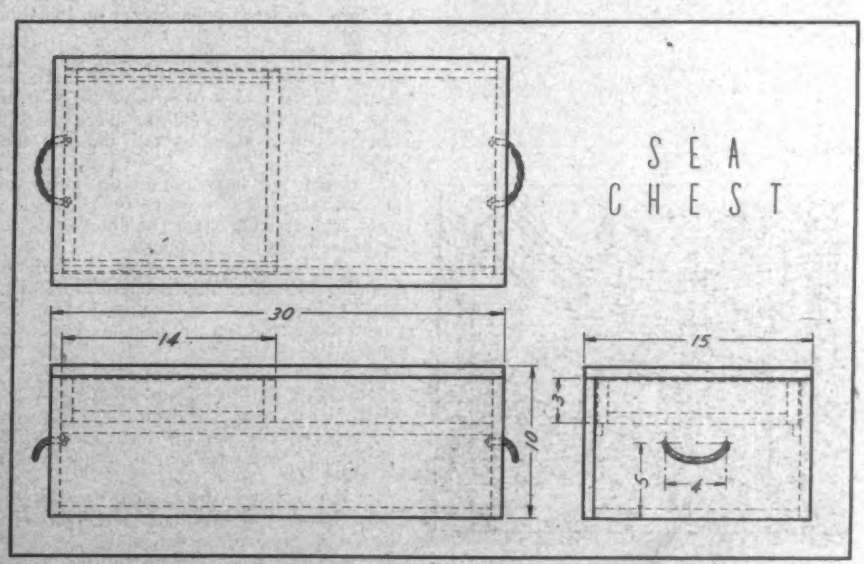


Fig. 5. Suggested design for the sea chest

WALL BRACKET

LYLE GARNETT
Milwaukee Vocational School
Milwaukee, Wis.

Purpose:

1. To make a half or split turning on the faceplate.
2. To make the curved railing for the top of the bracket.
3. To make the bracket.

Technical Information:

When making this bracket it will be best if a pair of them are made at the same time. It takes but little more work to make two instead of one because in the case of the bottom turning it will be necessary to make two turnings anyway. In making a split turning of this kind it will be necessary to fasten two pieces of stock to a faceplate and then turn the pieces to the pattern. The top shelf may be made in the same way if there is no shaper available to cut a corner bead molding on a ⅜-in. piece of stock. The scalloped railing is made by sawing half a railing from a piece of stock and matching it to a second piece sawed from the same piece of board. In that way the grain will be running in the right direction and not straight across the rail at some points and lengthwise at others. When boring the holes in the scallops it will be necessary to make a device for holding the curved pieces so the holes will be at right angles to the face of the molding and also to support the stock under the drill so the drill will not be broken in the drilling process. Such a device for holding the railing is known as a jig. This jig can be so designed that it will not only support the stock but that it will also space the holes the proper distance apart and the proper distance from the edge of the scallop.

The brackets are fastened to the wall by the use of two small hanger plates fastened to the back of the shelf.

BILL OF MATERIAL

No. of pieces	*Name of part*	*Size*
1	Top	⅜ x ? x 7¾
2	Bottom	2¼ x 2¼ x ?
2	Railing	⅜ x ? x ?

Tools and Machines:

Turning lathe, jig saw, drill stock, rule, compass, lathe tools, shaper, hammer, spoke shave, band saw, twist drill, screw driver, dividers.

Construction Procedure:

1. Select the type of material to be used in making the wall shelf.
2. Complete the stock bill using the exact dimensions given.

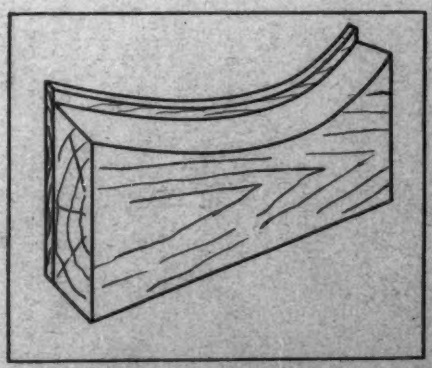


Fig. 2. Jig for boring the holes in the railing

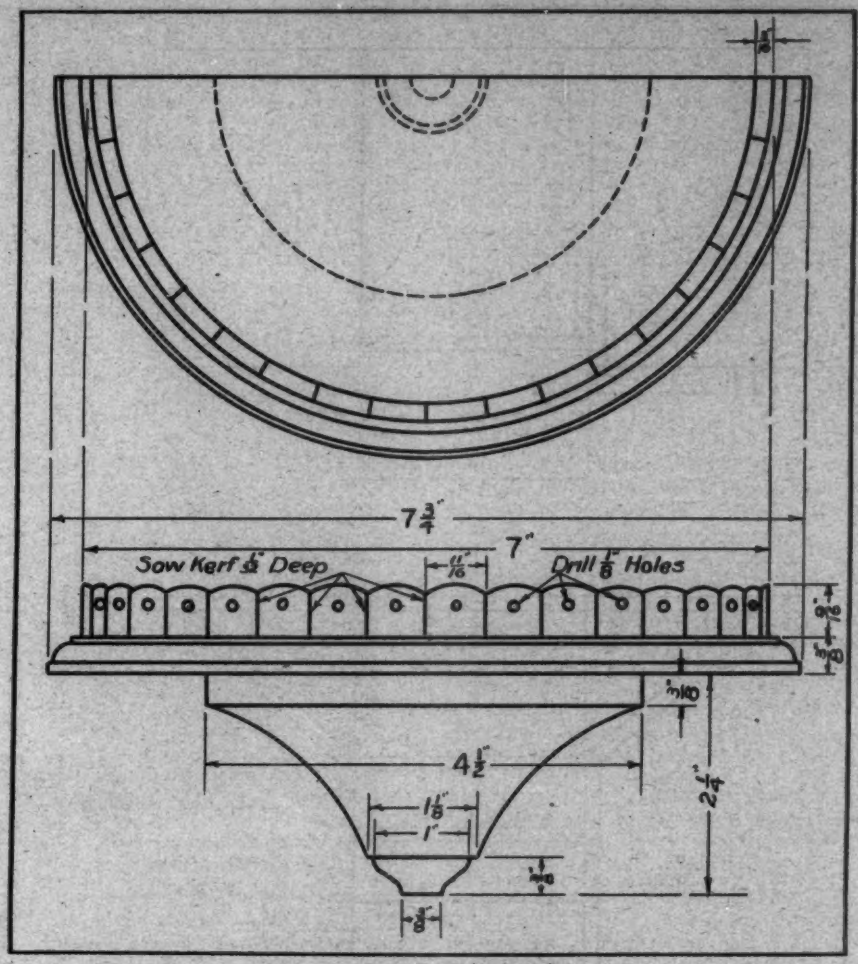


Fig. 1. Details of the bracket

3. Cut the pieces asked for in the stock bill roughly to size.

Note: This means that the pieces should be cut approximately ½ in. oversize.

4. Saw a circular piece of ¾-in. waste stock as large as the faceplate to be used.
5. Saw two semicircular pieces on the band saw from the 2¼-in. stock.
6. Mount the circular piece of waste stock on the faceplate with screws and mark the position of the screws in relation to the screw holes in the faceplate so the piece may be removed and replaced at will and still turn perfectly true.
7. Mount the faceplate on the lathe and turn the face of the board perfectly true if it is not already true. Mark the exact center of the piece while it is revolving.
8. Stop the lathe and while the faceplate is stationary, adjust the tool rest so as to be able to draw a line on the stock that will run through the center just marked while moving the pencil along the top of the tool rest.
9. Remove the stock from the faceplate and screw the two semicircular pieces to this wood plate. Have the parting line between the semicircular pieces follow the center line on the wood plate.
10. Remount the wood plate on the faceplate. Observe the positions of the screws in relation to the holes in the plate.
11. Replace the faceplate on the turning lathe and turn the bases to pattern.
12. Sandpaper the pieces very smoothly before removing them from the lathe.
13. Lay out the semicircular piece for the top of the bracket. This is to be ⅜ in. thick and 7¾ in. in diameter.
14. Saw the curved edge on the band saw.
15. Smooth the edge of the board with the spokeshave but do not sandpaper it if possible. The sanding will cause the shaper cutters to be dulled unnecessarily.
16. Set the shaper to cut a corner bead and cut the molding on the curved edge of the

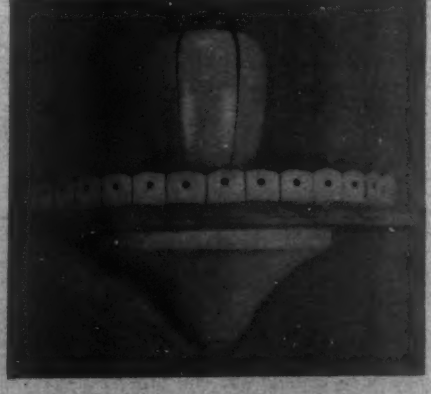


Fig. 3. The wall bracket

top. Use the circular gauge of the shaper for the guide or shape against a pin and collar.

17. Sandpaper all surfaces of the toppiece, finishing off with a rather fine grade of sandpaper.

18. Fasten the toppiece to the base with brads and glue.

19. Draw a quarter circular form on the piece of ⅝-in. stock. Use a compass for this and set the compass for a 3½-in. radius. Draw two of these arcs about ¾ in. apart.

20. Reduce the radius by 3/16 in. and draw a second arc in each instance, using the same center points as before.

21. Band saw these pieces and smooth the outer and the inner faces but try to keep a uniform thickness to the stock.

22. Saw off one end of each piece with a fine saw and join at the center line of the semicircular toppiece. If they do not fit perfectly, clamp the pieces to another piece of stock, and in the correct position, then run a backsaw between them.

23. Lay the pieces of the semicircular top in the correct position and measure the length needed after having spaced the rail equidistant from the edge of the top.

24. On the inside surface of the curved rail space off the scallops with the aid of a pair of dividers. Start from the center joint and space to the back. This will be a divider setting off approximately five eighths of an inch and should space off seven scallops.

25. Draw a pencil line parallel with the top edge of the rail and one fourth of an inch from it. Use the pencil and the tip of the middle finger to gauge the line.

26. Set a compass to a ¾-in. radius and draw in the top of the scallop so the curve touches the top of the rail and the line running parallel with the top edge.

27. Saw the scallops on the jig saw and saw each scallop from the upper edge to the lower end of the curve only.

28. Lay the curved piece on the table of the jig saw so the straight edge of the bottom of the piece is resting on the table. Make a very shallow saw cut on the outside of the curve at each point where the scallops come together. This line is a part of the decoration of the railing.

29. With a pair of dividers space off the mid-points of each of the scallops. This spacing should be done on the pencil line drawn parallel to the top edge of the rail previously.

30. Make the jig for boring the holes in the railing, as shown in Figure 2. This is done by sawing a concaved curve on a piece of stock. The curve is to be equal to the curve on the outside of the railing, that is, its radius is 3½ in. This does not have to be smoothed after the band sawing but the curve should be a perfect curve. Nail another piece of stock to one face of the curved stock to act as a stop or guide to the rail when it is laid in the jig. Fasten this jig in the vise and drill the holes by hand or fasten it in a drill press vise and drill the holes on the drill press. To do this drilling locate the jig under the drill so you will be able to drill one of the holes in the rail in the right position. Clamp the jig to the drill press table. Mark on the back of the jig the point where two of the scallops come together, then as one hole is bored, slide the railing along on the jig until the next point coincides with the mark on the jig and bore the next hole.

31. Sandpaper all surfaces of the rail.

32. Glue the rail to the top of the bracket. In most instances this may be done by applying a thin film of glue to the lower edge of the rail and pressing it into place allowing it to dry without the aid of clamps. It may be necessary to set the bracket upright in a vise while the glue is drying.

33. Cut the back ends of the railing flush with the back edge of the top after the glue on the railing is thoroughly dry.

34. Smooth the entire bracket with fine sandpaper prior to the finishing process.

35. Place two small hanger plates on the back of the top so the bracket may be held against the wall.

36. Finish with a dull finish suitable to the material used in making the bracket.

UTILITY PANTRY TABLE

SIMON S. PALESTRANT
Bronx, New York City

The utility pantry table described in this article is inexpensive yet large enough to be a handy addition to any pantry.

BILL OF MATERIAL

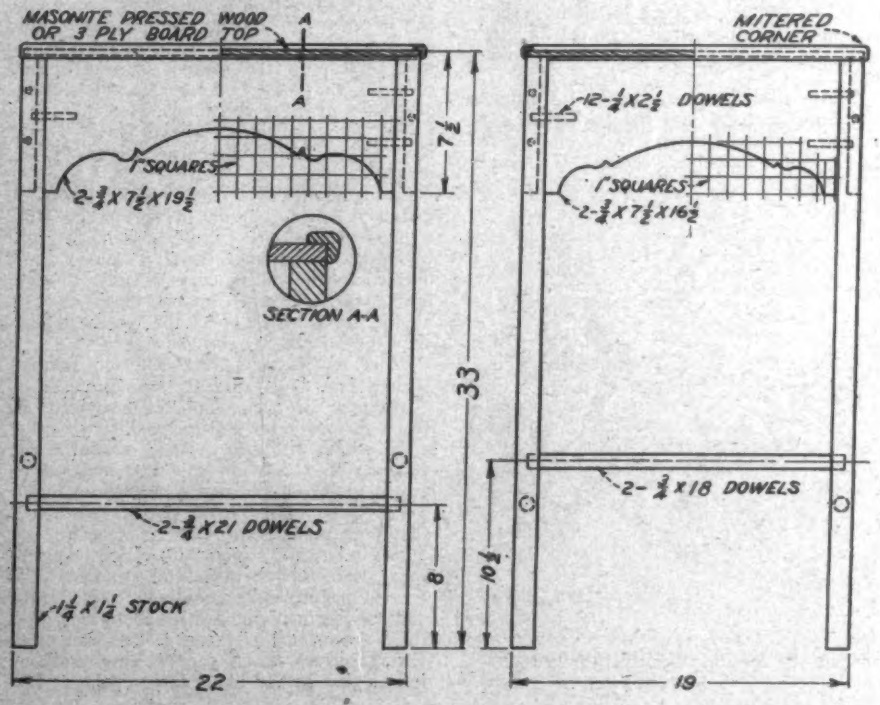
4 legs 1¼ by 1¼ by 33 in.
1 top (masonite) ¼ by 19 by 22 in.
2 pieces 1-in. corner molding 23 in. long
2 pieces 1-in. corner molding 20 in. long
2 rail stretchers ⅝ by 21-in. dowels
2 rail stretchers ⅝ by 18-in. dowels
2 apron stretchers ¾ by 7½ by 19½ in.
2 apron stretchers ¾ by 7½ by 16½ in.
12 pieces of ⅜ by 2¼-in. dowels

Cut the material to the size indicated in the stock bill. Drill ⅜-in. dowel joint holes into each end of the apron stretchers, 2 into the right end of each and 1 into the left. Use a doweling jig to make certain that you will get truly vertical holes. Drill (using a No. 6 dowel or auger bit) corresponding holes into the top ends of the table legs. Be certain that the top of the legs and the aprons are flush with each other. Check the depth of the holes so they match with the length of the dowel pins.

Now drill ⅝-in. holes (No. 10 auger or dowel bit) at those positions indicated for the leg rail stretchers. Number the legs and mark the adjacent ends with identical symbols so that they may be properly assembled. Apply any strong, liquid glue to the joints and fit them together properly. Tighten them, square them up, and hold them together with bar clamps until the glue has dried. Be sure, however, that all excess glue is washed off before it begins to set.

The utility pantry table and the student who made it

The toppiece which can be of masonite or ¼-in. ply with one side of choice veneer is then glued onto the top. It should be set



down tightly with three ¾-in. box or lath nails along each side instead of using the clamps. The edges of the toppiece are then sanded flush with the rails and legs of the table.

Frame the top with 1-in. corner molding. Use miter joints at all the corners and fasten them into place with glue and a few well-placed No. 20 by ¾-in. brads. When the glue has dried and hardened, sandpaper the entire job to perfect smoothness and remove all fingerprints and other smudges that may have found their way onto the surfaces during the various operations.

To properly finish this table, give it two fairly good coats of white lead or any other undercoat paint. Rub it down with No. 2/0 sandpaper after each coat has hardened. Then give the entire job a coat of cream colored enamel, and sand it again when hardened. The dark areas indicated on the photograph are painted with maroon enamel. Slow or quick drying enamels may be used, the slower drying ones will probably form harder surfaces. Other color combinations are:

Light Areas	*Dark Areas*
white	medium taupe gray
sand	medium olive gray
light gray	medium royal blue
pale yellow	medium steel gray
light apple green	medium olive drab
light aquamarine	gun metal gray
cream	maroon

When the colored coats of enameled paint have hardened, rub down the entire table with a rottenstone-and-water paste until the surface is as smooth as glass. Wipe off all the excess paste, then wax the entire surface. This will give the job a lovely luster and a water repellent and dirtproof protecting layer as well.

THE CASTING OF PLASTICS IN SCHOOL AND HOME SHOPS

ALEXANDER F. BICK, TEACHER
Milwaukee Public Schools and
Milwaukee Downer College
Milwaukee, Wis.

Without presses, furnaces, special equipment, or so much as a special ability, schools may now cast beautiful clear plastic accessories as simply as one pours water from a cup.

This in itself is of significance, for commercially the material referred to herein is attaining great importance notably in the fabrication of automobile bodies, as recently announced, and other commodities too numerous to enumerate.

A beautiful fern imprisoned in Castolite

Examples of Castolite projects

The fact that it may be poured cold as a syrup, congealed at room temperature by the addition of a few drops of hardener, and cured by the heat of an electric light bulb or by immersion in warm water marks a milestone in the development of a truly marvelous substance.

Today the word *plastic* is a magic one and now we have arrived at a point where "just folks" can use it in creating many things of varied colors and shapes. And what is more, in it may be embedded fragile flowers, pieces of lace, coins, photographs, colored plastic ornaments, borders, monograms, and the like. To work with it in schools is an experience worth any effort, and all that is required is that a few essentials be provided.

At the present it is sold under the distributor's name, Castolite. Later the same material may be widely available under other jobbers' names made at the same source.

It came to us through the kindness of Dr. H. L. Gerhart, the research chemist, who developed it along with other plastic manomers and he gave just enough encouragement and direction for us to set up shop with such simple goals as the making of sheets and rods. But we soon found ourselves discovering new ways of using this magic material.

The result of our research would cover much space and subsequently it shall be reviewed.

It might be well to mention the actors—first boys 12 to 14 years of age, in the Milwaukee schools, and second, girls in two accelerated occupational therapy courses conducted at the Milwaukee Downer College during the summers of 1944–45 in the rehabilitation program under the sponsorship of the Office of the Surgeon General.

While both groups worked also in methacrylate resins, all students cast projects in Castolite and at the end, no crafts subject was so much sought for and enjoyed.

An exhibit of finished articles proved a real success. Practically no one was prepared to accept such possibilities for the new material. To mention just a few of the many projects that were made, some clear and transparent, others in beautiful colors with varied textures; there were zipper pulls and pendants like jewels, magnifying glasses with colored rims and handles, name plates, bookholders, lamps, three-dimensional pictures, geometrically patterned screens, small paperweights, and one button that looked like a large opal.

You may ask "How is this material used?" Here is an abbreviated procedure schedule:

1. Prepare the mold. Clean and dry.
2. Pour a quantity of the Castolite into a measuring cup.
3. Add the given number of drops of the hardener.
4. Pour it into the mold. Allow 30 minutes for it to solidify at room temperature.
5. Place the casting into a covered box heated by a light bulb for 30 minutes.
6. Remove from mold and shape, drill, etc., using woodworking tools. Polish with three grades of wet-dry sandpaper, kitchen cleanser, and wax, or better by means of ordinary buffing compounds.

The cost of the projects is about what it would be if they had been made in metal. Small projects may be made for as little as 10 to 30 cents, particularly when the Castolite is purchased through the schools in quantity. However, there is a great need for the experimental individual kit, and this too may now be had on the market. From this may be cast as many as 20 small projects.

This material with its clean transparency, the ease with which it may be colored, and the beauty which it gives to the finished article, is just the right medium to incite the beginner to try new experiments and to strive for increasingly better results.

A DEEP SEA FISHING REEL

EVARETT I. RUSS and
SIMON S. PALESTRANT
William Howard Taft High School
New York City

The deep sea fishing reel shown here is made of wood. It has proved its worth again and again.

The job combines spindle turning and faceplate turning in their simpler phases and yet the end product is a fine, usable job.

The reel is made of a hard decorative wood such as mahogany or walnut. The stock should be prepared and glued to a backpiece.

The backpiece is a piece of scrap which is glued to the piece of wood to be turned. They are glued with a piece of craft paper between the two boards. Use hot animal hide glue. The backpiece serves to accept the screws which hold the job to the faceplate. Be sure the screws used do not go through the back into the better wood out of which the reel is made.

In order to remove the job from the backpiece, place a chisel right on the line made by

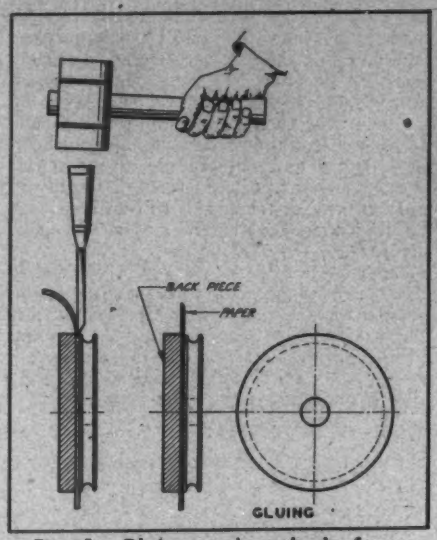


Fig. 1. Gluing and method of removal with chisel and mallet

the paper. See Figure 1. The bevel of the chisel should face the reel. Strike the chisel smartly with a mallet. The two boards will part easily.

The hole in the reel must be made of a size to fit the bearing of the reel seat. The reel seat may be purchased at any fishing supply store for about 50 cents. See Figures 2 and 3.

The two handles are turned at one turning. Be sure that enough wood is left on the live center side for safety in working on that end of the spindle turning. After the handles are turned they are cut apart. They then have a ¼-in. hole bored through them to take the bolt that is to act as axle for the handles. See Figure 4.

The handles are fastened to one side of the reel in the following way. A ¼-in. hole is bored through the reel at points *A* and *B*, Figure 2. These holes on one side of the reel, are counterbored to ½-in. size, and ½-in. depth. If plug cutters are not available this hole may be made square with a chisel so a square plug may be used. On the other side a hole is bored to a size to make a press fit for one of the axle nuts. Fasten the handles to the axle as shown in Figure 5.

Reel

Size of Stock: 1½ by 7 by 7 in. mahogany
Tools: Wood-turning lathe, lathe tools.
Procedure:

1. Mount work on the faceplate. See Figure 1.
2. Turn to a diameter of 6½ in.

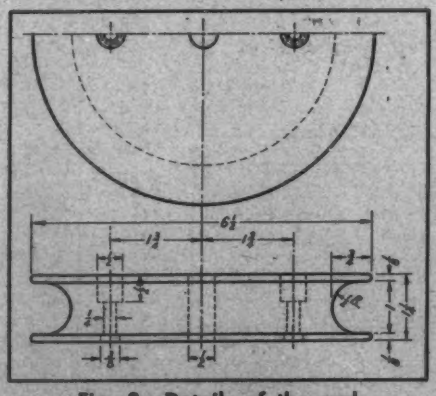


Fig. 2. Details of the reel

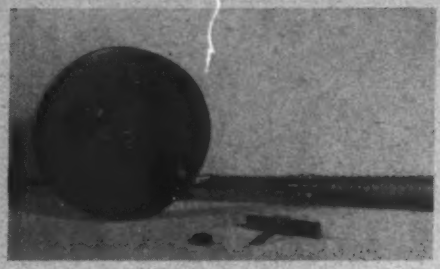


Fig. 3. The reel and reel seat

3. Face the work with the diamond point.
4. Cut groove to a depth of ¾ in. and 1 in. wide.
5. Bore a ½-in. hole through job with a small round nose chisel.
6. Sand the work thoroughly. Sponge with water and sand again.
7. Remove the job from the backpiece with a chisel and a mallet, as per directions. Sand the other side.
8. Fill the pores of the wood.

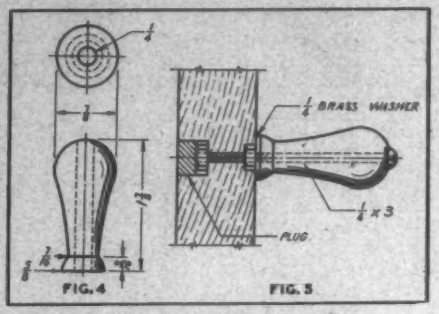


Fig. 4. Details of handle
Fig. 5. Assembly of handle

9. Remove the work from the lathe and cut the handles apart.
10. Drill a ¼-in. hole through each handle.
11. Finish the same as the reel.

Assembly

1. Fasten handles to the reel as shown in Figure 5.

Fig. 6. Ready to reel in the catch

9. Finish with linseed oil or spar varnish.
10. The bearing of the reel seat should be a drive fit into the hole in the reel. Drive bearing in place.
11. Bore ¼-in. hole through the reel at points shown. See Figure 2.
12. Bore nut and plug holes as shown.

Handles

Size of Stock: 1¾ by 1¾ by 6-in. mahogany
Materials:
2¼ by 3-in. r.h. brass machine bolts
2¼-in. brass washers
2 3/16-in. brass washers reamed out to fit ¼-in. bolt
4¼-in. hex. brass nuts
Tools: Wood-turning lathe and lathe tools
Procedure:

1. Get out stock and square ends.
2. Locate the centers on the stock.
3. Mount the stock between the lathe centers.
4. Turn to the largest diameter.
5. Lay out the dimensions.
6. Part to diameters.
7. Cut in the contours.
8. Sand the work thoroughly, sponge with water and sand again.
2. Cut the proper size plugs.
3. Set the plugs and finish off smooth.
4. Finish as the rest of the reel.

DESIGNS COPIED ELECTRICALLY IN METAL

NATHAN BOGOCH
Winnipeg, Manitoba, Canada

Turners of ornamental pieces seldom seem to realize that it is possible to reproduce in metal the many intricate designs that they turn out in wood on their lathe. It will be readily seen that a metal copy is superior to the wooden one, at least for some uses, and that a number of metallic copies can be made by the method described here in a comparatively short time. Not only can articles made of wood be faithfully copied by the process about to be described, but medals, engravings, and the like also can be duplicated.

The equipment required is very simple. A 2- or 4-volt storage battery, a fairly deep porcelain or glass dish, and an ammeter is all that is required. The ammeter is put in the circuit to show how much current is flowing, but may be dispensed with if this convenience is not desired.

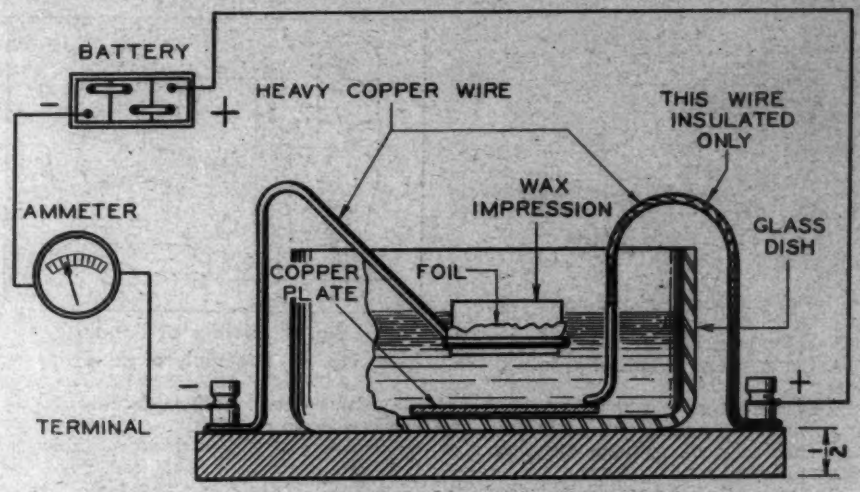


Fig. 1. Setup for making copper reproductions of medals, etc.

The dish is mounted on a suitable piece of hardwood, ½ in. thick, as shown in Figure 1. Two terminals are next mounted on the board, and a piece of 16-gauge wire, bent as shown, attached to each. To one of these wires a fairly thick copper plate is soldered. The dimensions of the plate are immaterial, but about 2 by 2 in. will be suitable. The wire, but not the plate, must now receive a coat of asphaltum to insulate it from the solution. The other wire carrying the work need not be insulated.

The plating solution is made by dissolving ¼ lb. of copper sulphate in a pint of water, and adding one fluid ounce of sulphuric acid to the solution.

The work to be copied must not have any parts which are undercut, or difficulty will be experienced.

We will suppose a medal is to be copied. Clean the medal and press it into a piece of ordinary paraffin wax that has been softened. Then brush the paraffin copy with a fine graphite in order that the wax may become a conductor of electricity. The brush used for this purpose should be soft enough that it will not scratch the wax. The black lead may be made into a paste with water, and it should be brushed over the face and well up the sides. When finished the wax should look like a metallic surface. When the impression has been sufficiently polished, a piece of tinfoil should be wrapped around it, in good contact with the black lead on the sides, but leaving the face with the impression on it open. The foil is then bound with thin copper wire and attached to the thick supporting wire as shown. The dish should then be filled with the plating solution, taking care that the face of the wax impression is completely immersed and that there are no air bubbles adhering. It only remains now to connect the battery as shown making the wax negative and the copper plate positive. The wax and the copper plate should be separated by about ¼ in. in the bath. The current, which is small, should be allowed to run without being disturbed for about half a day, or until the desired thickness of copper has been obtained. Usually it will be found at the end of half an hour that a thick copper coat has been deposited upon the wax.

On separating the two, it will be seen that the copper has taken up the exact shape of the original medal. It only remains now to wash and dry the copy and, perhaps, trim up the edges.

ORNAMENTAL TIN CRAFT

CHRIS H. GRONEMAN
Industrial Education Department
A. & M. College of Texas
College Station, Tex.

(Continued from page 306 of the September, 1946, issue)

Trinket Box — Metal Covered

A metal box for storing necklaces, ear bobs, dress rings, etc., will be most welcome for a lady to place on her dressing table. There is nothing particularly difficult in the construction of this novelty box except that all parts must be accurate so they will fit at the corners and hide the wooden box.

Single thickness 30-gauge sheet tin is used for the metal part of this box. The surface may be ornamented with chair gliders and roundhead brads to form delightful designs as shown in the drawing and photograph. Naturally, these ideas and the size of the box can be changed to suit the needs of the lady and the ingenuity of the craftsman. The brads also serve the purpose of holding the metal

(Continued on page 22A)

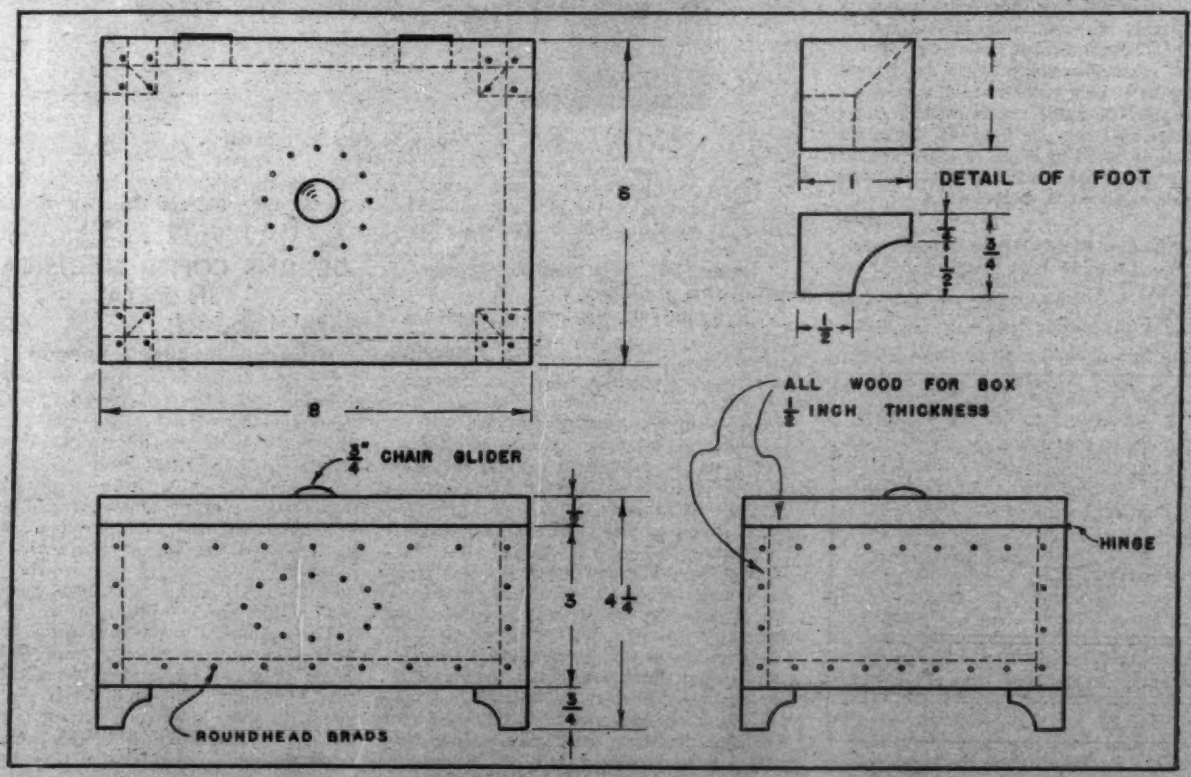
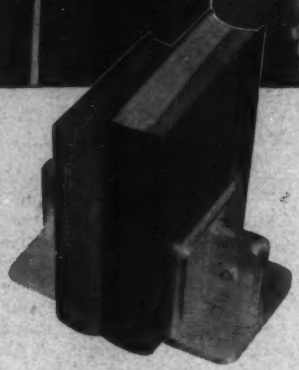


Fig. 1. Trinket box and cover



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The useful and artistic articles shown here are but a few of many that students will enjoy making.

For information on aluminum, write ALUMINUM COMPANY OF AMERICA, 1773 Gulf Bldg., Pittsburgh 19, Pennsylvania.

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GROUP III—High Schools offering more than 10 hours per week. First Prize, $50; Second Prize, $25; Third Prize, $10; nine Honorable Mentions, $5 each.

ALCOA FIRST IN ALUMINUM

For the Rules Booklet for Scholastic Industrial Arts Awards, write to: Scholastic Awards, 220 E. 42nd St., New York 17, N. Y.

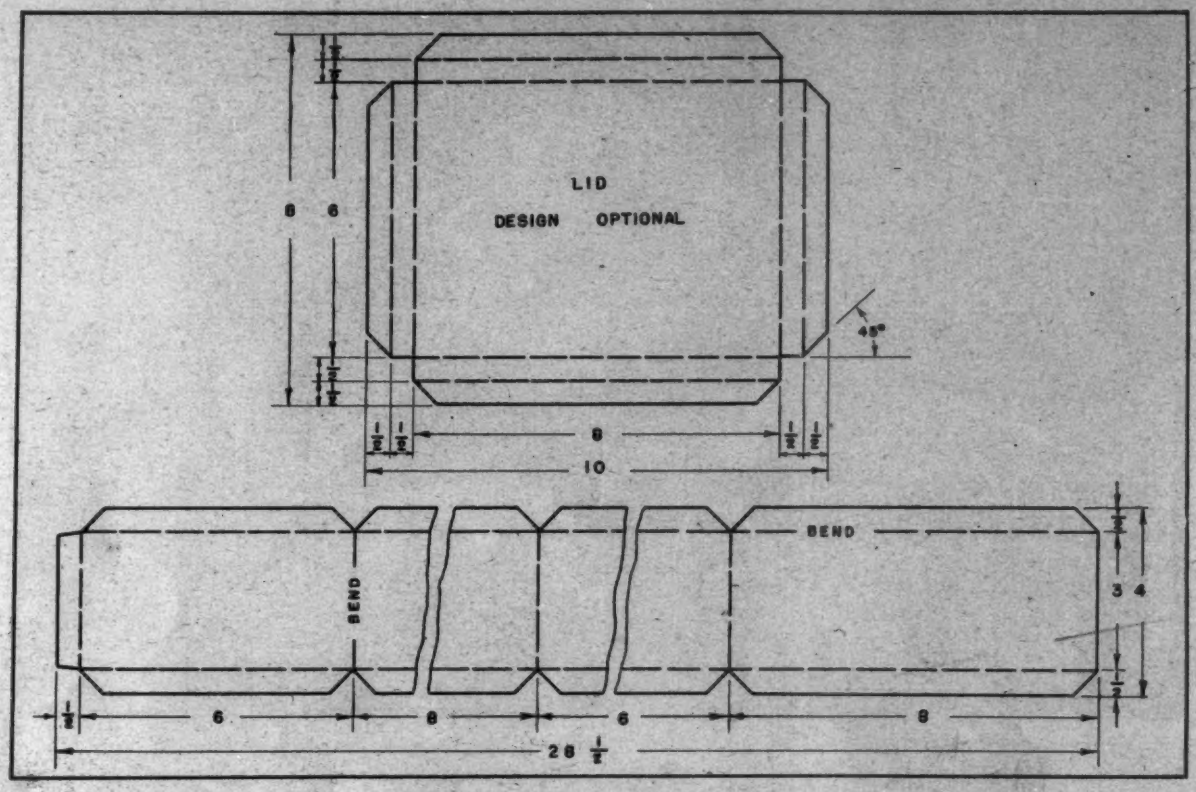

Fig. 2. Layout of metal covering

(Continued from page 378)

securely to the wooden box. The covering process will be much easier and simplified if all corner joints of the metal are soldered. This conceals the wood and makes for neater joints. The feet may be made from any desired woods, and held in place with screws. The color, applied with a brush or sprayed on the metal, is put on to add to the novelty of the box.

BILL OF MATERIALS

No. of pieces	*Item*	*Size*
1	Wood box	3 x 6 x 8 (½" stock)
1	Wood lid for box	½ x 6 x 8
1 pr.	Suitable metal hinges	
4	Suitable wooden feet	¾ x 1 x 1
1	Sheet tin	8 x 10
1	Sheet tin	4 x 28½
1	Chair glider	¾ in.
4	FHB screws	1¼" No. 6

Roundhead brads, solder, flux, steel wool

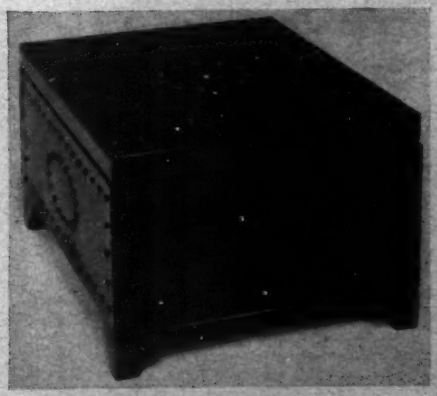

Fig. 3. Metal covered trinket box

Tools: Alcohol burner, bar folder or blocks for bending, emery cloth, file, hammer, hand drill and bit, heating device, pencil, rule, scriber, soldering copper, tin snips, and necessary tools for making wooden box.

Procedure

1. Make wooden box, lid, and feet. See Figure 1.
2. Select design and pattern for metal cover. See Figure 2.
3. Lay out and cut out sheet tin stock.
4. Fold as marked to fit wood box.
5. Fasten metal cover to box and lid.
6. Solder corner joints of metal covering.
7. Lay out design on cover and front and finish with roundhead brads and chair glider.
8. Fasten lid to box with hinges.
9. Apply color lacquer to metal box.
10. Fasten wooden feet to box.

THE SCHOOL'S PART IN THE WAR EFFORT

The following are a few high lights on what the school did to make possible the victory that was won by the allies in World War II. The material presented here was compiled by the National Education Association's research division.

The schools and colleges of the United States made indispensable contributions to the nation's war effort. Among other things they:

1. Laid the foundations upon which a citizens' army was quickly built. In World War I only 20 per cent of the members of the armed forces had more than an eighth-grade education; in World War II, almost 70 per cent had more than an eighth-grade education.
2. Gave at least 70,000 teachers to the armed services. The educational and visual instruction programs of the military forces were largely manned by former teachers.
3. Provided facilities and personnel for training officers and specialists. The army's college training programs graduated 64,332 men between April, 1943, and December, 1945. The navy's officer candidate, medical, electronic, and women's reserve training programs graduated 133,963 persons.
4. Carried through a training program designed to increase industrial production and the supply of food. Pre-employment courses were given to 2,667,000; supplementary vocational courses to 4,800,000; and agricultural training to 4,188,000 students.
5. Registered millions of men for the Selective Service. In most communities school buildings were used and thousands of teachers voluntarily gave time as registration clerks.
6. Registered citizens and distributed 415,000,000 ration books. Many teachers served on the rationing boards — in August, 1945, of the 126,000 board members, nearly 7600 were educators.
7. Participated in the drives to collect wastepaper and metal. Out of 25,000,000 tons of paper collected, it is estimated by authorities that the schools collected at least 2,500,000 tons.
8. Sold two billion dollars' worth of war bonds and stamps. In 1945 more than 25,000,000 pupils were participating in school savings plans as compared to 2,500,000 in 1941.
9. Provided headquarters for civilian de-

(Continued on page 24A)

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(Continued from page 22A)

fense activities. Partial reports from city school systems indicate that one in ten teachers participated in such activities.

10. Assisted the Junior Red Cross produce over 35,000,000 comfort and recreational articles for the armed forces. In addition, medical chests, dried milk, and educational gift boxes were sent to children in the war zones.

11. Gave thousands of hours to war-supporting agencies. Among these were the United Service Organizations, American Red Cross, war relief drive for our Allies, book drives of the American Library Association, and nursery schools and child-care programs.

Skidding was a factor in 3 per cent of all the 4,800,000 traffic accidents in 1944. —*National Safety Council.*

Personal News

♦ WAYNE P. HUGHES, Ed.D., has been named director of the school and college division of the National Safety Council.

Dr. Hughes succeeds Dr. Kimball Wiles, who has joined the faculty of New York University as associate professor of education.

Dr. Hughes came to the National Safety Council in 1943 as field representative for the school and college division. He also has been the Council's specialist in school shop safety and driver training. He brings to his new position a background of many years of specialization in safety education.

He was graduated from The Stout Institute, Menomonie, Wis., where he received the degree of bachelor of science. He received his master of arts degree from Teachers College, Columbia University, New York City, and the degree of doctor of education at the Center for Safety Education, New York University, New York City.

In 1938–39, Dr. Hughes held a teaching fellowship at the Center for Safety Education, conducting classes in traffic and shop safety. Before coming to the Council in 1943, he had been a member of the staff of the Eastern Illinois State Teachers College since 1923, and was responsible for the development of the traffic safety courses offered by the college.

♦ EDGAR G. DOUDNA, Madison, Wis., vice-chairman of the Wisconsin state board of normal school regents, was elected to the board of trustees of the National Education Association at its annual meeting at Buffalo, N. Y., on July 6, 1946.

♦ ROBERT B. OTIS, business manager of the Milwaukee Vocational School, Milwaukee, Wis., retired after having served that school in various capacities for 32 years.

Mr. Otis was graduated from the University of Michigan in 1903. He taught the evening school classes in auto mechanics and steam engineering for 25 years while handling administrative duties on a day schedule.

Since 1931 he has been the business manager of the school.

Mr. Otis has rendered outstanding services almost from the very inception of the Milwaukee Vocational School and his many friends at the school and throughout the city of Milwaukee wish him many more years of enjoyable living now that he has retired from active service.

♦ HIRAM BARG, who joined the staff of the Milwaukee Vocational School, Milwaukee, Wis., in 1928, has been made business manager of the school to fill the place left vacant by the retirement of Robert B. Otis.

Mr. Barg taught commercial subjects when he joined the school. In 1931 he was appointed counselor for the commercial department of the evening school, and in 1931 faculty counselor for the day school. This involved supervisorial duties in the subject fields of distributive education and personnel related work. Besides these duties he was put in charge of the personnel work of the school.

He will still continue his personnel work now that he has been made business manager of the school.

Mr. Barg received his B.S. degree at the University of Minnesota, and has finished considerable graduate work at Marquette University, Milwaukee.

♦ URBAN L. MONICAL and CLIFFORD L. YARD have joined the industrial-arts faculty of the State Teachers College at Millersville, Pa.

Mr. Monical comes from Greenhills, Ohio, where he was director of the industrial-arts laboratory. He is a graduate of the Eastern Illinois State Teachers College, with a master's degree from the Ohio State University.

Mr. Yard, a graduate of Western Illinois State Teachers College, with a master's degree from Columbia University, comes from Norwalk, Conn., and New York University.

♦ GARROTT BARICH, who until recently taught army air forces personnel at Chanute Field and Yale University, is now stationed at Lowry Field, Colo., where he is supervisor in the Department of Automotive Maintenance Training.

♦ DR. JARVIS M. MORSE has been appointed director of the Education Section, U. S. Savings Bonds Division of the Treasury Department.

A native of Connecticut, Dr. Morse earned his degrees at Yale in history and economics. After two years as history instructor at Moses Brown School, Providence, R. I., he returned to Yale as instructor in history, later becoming assistant professor of American history at Brown University. In addition to his teaching schedule, he became state director for the Federal Writers' Project in Rhode Island in 1935.

Since joining the Treasury Department in 1941 as special assistant to the field director, Dr. Morse has been closely associated with the School Savings Program and its development.

(Continued on page 26A)

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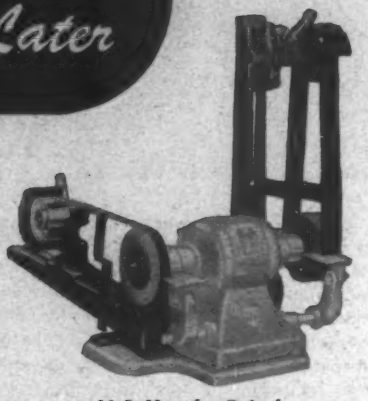

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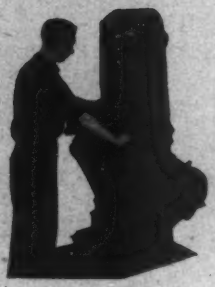

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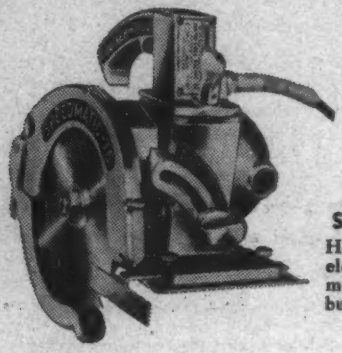

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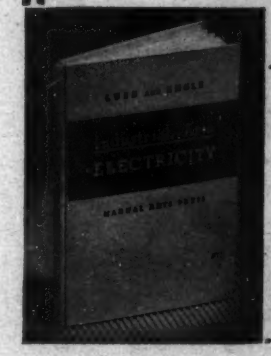

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(Continued from page 24A)

♦ ARTHUR WALD has been appointed supervisor of training at the North Georgia Vocational School, Clarkesville, Ga.

Mr. Wald received a B.S. degree from the University of Wisconsin in 1924, and an M.A. degree from Ohio State University in 1937. He learned the machinist trade in Milwaukee, Wis. From 1924 to 1929 he was principal of a trade school in India. Since 1929 Mr. Wald has engaged in industrial-education work in Ohio. The school at Clarkesville is the first Area Vocational School to be established in Georgia.

♦ R. WORTH PETERS, former director of the Manassas State Vocational School, Manassas, Va., has been appointed superintendent of Prince William County Schools.

He is a native of Franklin, Va., and has been associated with the Prince William School system for the past 15 years.

He is a graduate of Randolph-Macon College, Ashland, Va., and received his M.A. degree from the University of Virginia.

♦ ROBERT W. ENGLISH, industrial teacher trainer at Southern Illinois Normal University, Carbondale, Ill., since 1940, has just returned to the classroom after serving two years as a lieutenant in the navy. His assignments with the navy were in officer candidate training and personnel activities. In addition to teacher training, Mr. English will now help develop the industrial education program of Southern's new College of Vocations and Professions.

♦ EDWARD J. ENGESETH retired on June 7, 1946, after teaching industrial arts in the Wauwatosa Public Schools, Wauwatosa, Wis., for the past 38 years.

♦ JEROME E. LEAVITT has been appointed head of the industrial-arts division of the schools at the Atomic Research Center, Los Alamos, N. Mex. Mr. Leavitt will also work in the high school field.

He has his B.S. degree from the New Jersey State Teachers College, Newark, N. J.; and his M.A. degree from the School of Education, New York University. He reorganized the industrial-arts program in St. Petersburg, Fla., and during the past summer taught at the Hampton Institute, Hampton, Va.

Mr. Leavitt is a regular contributor to professional literature in his field.

♦ J. M. BERTOTTI, director of sales training at Carboloy Co., Inc., Detroit, Mich., has been elected a member of the National Society of Sales Training Executives. In addition to his sales training work at Carboloy, Mr. Bertotti also supervises the company's extensive customer training courses.

Bertotti's varied background includes tooling work at Ford Motor Company and the Naval Ordnance Plant in Detroit, and six years as mathematics instructor in the Grosse Pointe High School and the Detroit Institute of Technology.

♦ PAUL M. REID, former superintendent of schools at Syracuse, Neb., has been appointed state supervisor of vocational rehabilitation of Nebraska.

♦ OTTO RUFF, recently discharged from the navy, has been appointed state director of veterans' education at Nebraska City, Neb.

♦ FLOYD W. LEE, 52, head of the industrial-arts department at Pekin Community High School, Pekin, Ill., died July 31, 1946.

Mr. Lee held this position for 27 years. He is well known in Illinois as a real leader in industrial education, and has been active in industrial-teacher organizations. He is a past chairman of the Peoria Industrial Club.

Association News

♦ The Lake County Audio-Visual Conference met at the Waukegan Township Secondary School, Waukegan, Ill., on May 3, 1946.

W. C. Petty, superintendent of Lake County Schools, was chairman of the morning session.

The first speaker, Dr. Stephen M. Corey, University of Chicago, spoke on "Sponsored Instruction Pictures."

The subject chosen by Dr. John Guy Fowlkes, University of Wisconsin, was "What Is Visual Education?"

Dr. J. Lloyd Trump, superintendent of Waukegan Township Secondary Schools, was chairman at the luncheon meeting held at 12 o'clock.

The afternoon was devoted to group discussions.

♦ The Industrial Arts Club at Colorado A. & M. College, Ft. Collins, Colo., is again on its way to reach its prewar position as one of the leading clubs on the campus during the summer months. Its members represented 14 states and 1 province of Canada. Weekly meetings at which time the group was privileged to hear lectures by leaders in the field of industrial arts and general education, attend demonstrations and luncheons, constituted part of the program for the summer.

One of the high lights of the season was a joint dinner meeting with the Industrial Arts Club of Greeley State College at Greeley, Colo. In past summers this was an annual affair but during the war it had been discontinued.

The officers of the club for the past summer were:

L. H. Lehman, president, Chisholm, Minn.; Neil J. Cameron, vice-president, Calgary, Alta., Can.; Joe Irish, secretary, Roanoke, Va.; George F. Henry, sponsor, Colorado A. & M. College.—*O. M. Friesen.*

♦ At the annual business meeting of the Nebraska Vocational Agriculture Association, Lewis Kein of Seward, Neb., was elected president for the coming year. Roy Equall of Superior was elected vice-president, and Alvin Reimer of DeWitt, secretary.

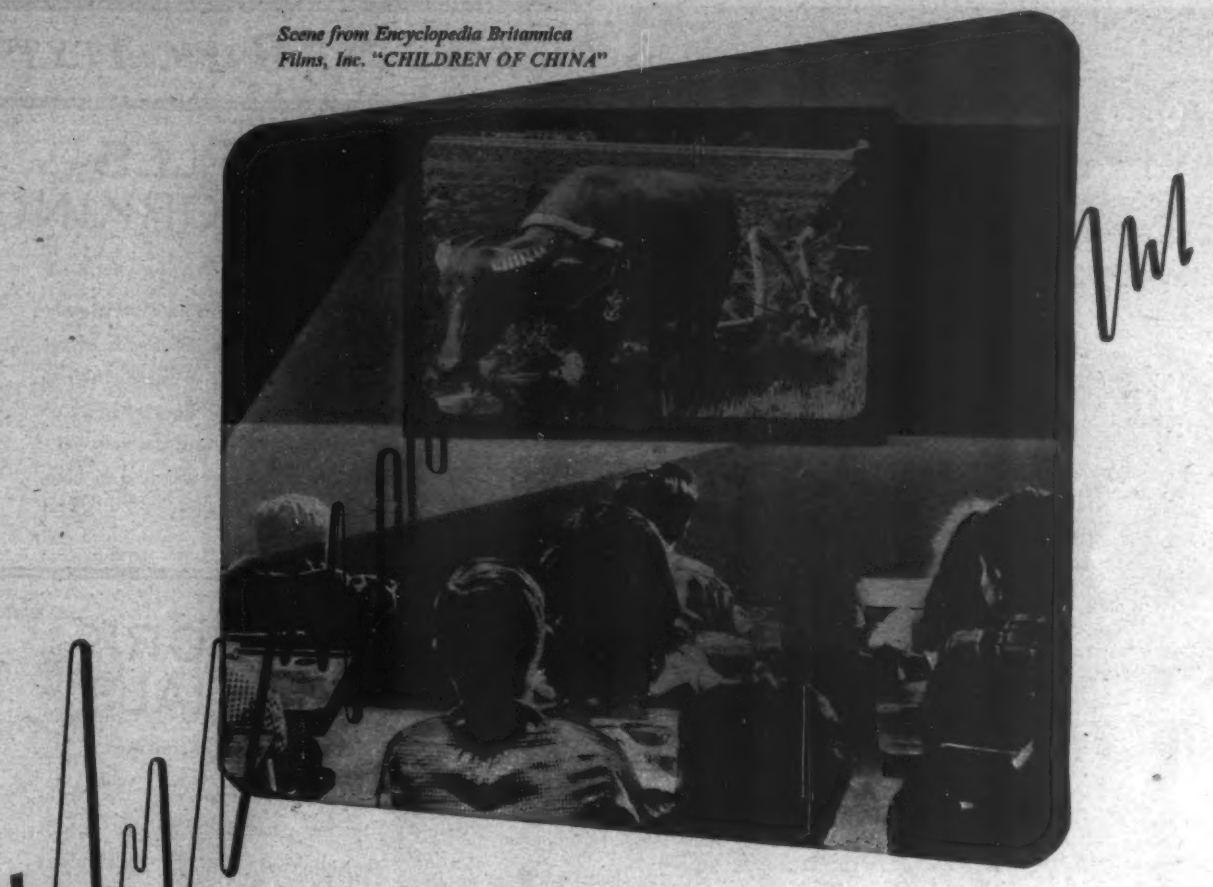
District officers elected are:

District 1: Harold Davis of Fairbury, chairman; L. E. Watson of Humboldt, secretary.

District 2: Elvin Schultz of Crete, chairman; James Wall of Waverly, secretary.

(Continued on page 29A)

Scene from Encyclopedia Britannica Films, Inc. "CHILDREN OF CHINA"



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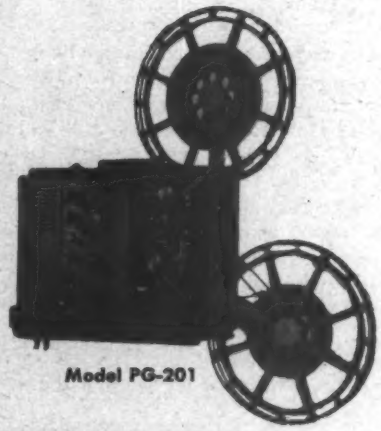

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(Continued from page 26A)

District 3: Dean Lancaster of West Point, chairman; B. E. Gingery of Stanton, secretary.

District 4: Elder Splitgerber of Albion, chairman; Oren Schneider of Genoa, secretary.

District 5: Bob Gingery of Sargent, chairman; H. O. Huntzinger, Broken Bow, secretary.

District 6: Ralph Vose of Cozad, chairman; Walter Crumbliss of Ravenna, secretary.

District 7: L. B. Newman of Sidney, chairman; John Webb of Big Spring, secretary.

District 8: John Cromer of Gordon, chairman; Dean Lundy of Harrison, secretary.

♦ A 20-year downward trend in accidents to children between the ages of 5 and 14 years has been reversed and accidental deaths are mounting. Top educators from all parts of the United States will meet to discover a way of stopping this upward trend October 7–11 at the 34th National Safety Congress and Exposition at Hotel Stevens in Chicago.

There will be 12 school sessions on safety including four general sessions in the afternoon. The morning sessions will be devoted to special group interests. Tuesday morning there will be a meeting on higher education, one on physical education, and one on home economics. Wednesday morning will include sessions on secondary school problems and industrial education. On Thursday morning, a group interested in driver education and training, another group on safety engineers in engineering colleges, and a third group interested in elementary schools will meet. All meetings will be under the direction of Dr. Wayne P. Hughes, director, school and college division of the National Safety Council.

COMING CONVENTIONS

September 27–28. Wyoming Education Association at Rock Springs, Wyo. (Southwest District). A. L. Burgoon, secretary, Diamondville, Wyo.

October 3–4. Wyoming Education Association at Torrington, Wyo. (Southeast District). S. Paul Brown, secretary, Hawk Springs, Wyo.

October 3–4. Wyoming Education Association at Casper, Wyo. (Central, Northeast, and Northwest Districts). Miss Gwendolyn Hill, secretary, High School, Casper, Wyo.

October 3–4. Michigan Education Association, Region 5, at Petoskey, Mich. Clifford Buchmaster, secretary, High School, Petoskey, Mich.

October 3–4. Michigan Education Association, Region 7, at Escanaba, Mich. Clarence Pearson, secretary, High School, Escanaba, Mich.

October 10–11. Michigan Education Association, Region 6, at Detroit, Mich. Frances Stubbs, secretary, 2330 Grand River, Detroit 1, Mich.

October 10–11. Michigan Education Association, Region 8, at Kalamazoo, Mich. O. K. Christian, secretary, Central High School, Kalamazoo, Mich.

October 17–18. Michigan Education Association, Region 2, at Flint, Mich. Howard Jackson, secretary, Zimmerman Jr. High School, Flint, Mich.

October 17–18. Michigan Education Association, Region 3, at East Lansing, Mich. A. J. Huggett, secretary, Department of Education, Michigan State College, East Lansing, Mich.

October 24–25. Michigan Education Association, Region 1, at Detroit, Mich. Frances Stubbs, secretary, 2330 Grand River, Detroit, Mich.

October 24–25. Michigan Education Association, Region 4, at Grand Rapids, Mich. Lowell McDougal, secretary, Central High School, Grand Rapids, Mich.

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Questions and Answers

REFINISHING FUMED OAK

1116. Q.: I would like to refinish a fumed oak dining suite to almost a natural finish. The chairs are solid quartered oak, the table top is veneered. The present finish was obtained by using a fumed oak stain and then shellacked and waxed. How would you suggest to remove present finish? — *O. H. D.*

A.: The problem of refinishing an oak dining room set of fumed finish is not too difficult. The following specification will be of value.

1. Take the table apart to its fullest extent without breaking any glue joints. If the skirt is screwed onto the top remove the screws and separate, since this will make for much easier work.

2. Use denatured alcohol and No. 2 steel wool pads (gloved hands) to soften and then strip off all old finish. Do a small area (18 in.) at a time and wipe up clean with burlap or rag squares, at the same time using fresh alcohol freely. Do *not* use varnish removers due to the open pored condition of the older finish. The wax getting into the open pores will be sure to cause later trouble if remover is used.

3. Dry hard. Sand with felt or rubber faced sanding blocks until the clear wood color prevails. Avoid sanding through the veneers on the top. Round all sharp edges 1/16 in. to avoid wearing through the new finish, after it has been stained and completed. Sponge with warm water, dry, resand, and then use DuPont Penetrating Wood Finish according to the directions on page 123 of *Wood Finishing and Painting Made Easy* (published by The Bruce Publishing Company), in order to secure and maintain a very fine and durable finish. — *Ralph G. Waring.*

News Notes

♦ To advance the development of skilled workers in the building trades who will be needed for the National Housing Program, credit is being granted for previous work experience toward completion of the term of apprenticeship, and

(Continued on next page)

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(Continued from previous page)

ratios of apprentices to journeymen are being liberalized.

Credit for previous work experience was given to about 28 per cent of apprentices who have been employed in the building trades in recent months, and one out of every five veteran-apprentices was given that credit for experience gained while in the armed forces.

Reports show that the ratios of apprentices to journeymen are being liberalized in many areas. The Building Trades Council, A. F. of L., of Duluth, Minn., has increased its prewar ratio of one apprentice to 10 journeymen to 1 to 5, and in some of the building trades in Duluth the ratio has been increased to 1 to 3.

In Wichita, Kans., the ratio for plumbers has been raised from 1 to 5 to 1 to 3 by the joint apprenticeship committee representing the United Association of Journeymen Plumbers and Steamfitters, Local 171, A. F. of L., and the Wichita Plumbers Association.

♦ The Henry Ford Trade School Alumni Association honored Dr. Frederick E. Searle, educational adviser and consultant to all Ford schools, at a dinner staged at the Birmingham Country Club, June 25 at 7:00 p.m.

The Alumni Association was organized in 1944 and incorporated under Michigan laws to become legal custodians of the "Broadhearth Fund," contributed as a token of "appreciation for educational opportunities" by graduates, instructors, students, personnel, and other friends of the many Ford schools.

It was the intention of the Alumni to buy and present to Henry Ford for his Greenfield Village Americana the first metal foundry in the Americas. Because the townsmen of Saugus, Mass., wished to retain the historic edifice, known as "Broadhearth," the title, which had been presented to Mr. Ford, was relinquished. In its place, the Alumni Association presented to Mr. Ford "The Book of Psalms" which formerly was owned by Abraham Lincoln. The presentation was made by Henry Ford II without ceremony, and no one else present.

The board of directors of the Alumni Association, to which all graduates of the Trade School are invited to make membership application, consists of the following: Roy L. Blanchard, 1928, president; Ernest L. Bridge, 1924, vice-president; Butler Brewen, 1932, secretary-treasurer; Thomas J. Crowley, 1922, past president; John A. Lutz, 1922; Elvin W. Day, 1923; William F. Mueller, 1923; Oscar A. Roberts, 1923; John D. O'Connell, 1927; John E. Dobrei, 1930; and Ray Hollander, 1930.

Among the "aims and purposes" of the Association is the intention "to promote and to preserve the integrity, industry, technical skill, and honor instilled by training received or required at Henry Ford Trade School and to assist in promoting and inculcating respect for such virtues by every means possible."

♦ Purdue University, whose curriculums include several aviation courses, has applied to the Civil Aeronautics Board for permission to operate an experimental feeder air line between Chicago and Evansville, Ind. The object is to provide practical instruction for students in the special engineering course as well as to benefit aviation generally through the possible benefits of intensive research.

♦ A stadium at an estimated cost of $510,000 will be erected at the School of Technology, 225 N. Ave., Atlanta, Ga. Bush Brown Galley is the architect.

♦ A vocational school will be built at Waynesville, N. C. The estimated cost is $225,000. H. M. Bowles, superintendent, Haywood County board of education.

♦ The School of Trades, Gadsden, Ala., will add a dormitory at an estimated cost of $150,000. P. W. Hofferbert is the architect. Dr. Clarence Donnelly, superintendent.

♦ The industrial-arts classes of the city schools at Barberton, Ohio, have made four-place swings for eight of the elementary schools during the past school year. The swings are made of welded pipe.

A summer project included the building of six 90-ft. towers for floodlighting the football stadium.

♦ Vocational counselors, ex-G.I.'s, students, and anyone interested in entering the air conditioning industry as a service and repairman will find helpful information in a new six-page leaflet on employment in this field just published by Occupational Index, Inc., New York University, New York 3, N. Y.

♦ Postwar employment prospects in six occupations are described in six different six-page occupational abstracts just revised and published by Occupational Index, Inc., New York University, New York 3, N. Y.

The occupations covered are: barber, dentist, electrician, electric lineman, general houseworker, and welder.

♦ Vocational counselors, and anyone who wants to make a living from his interest in traveling, will find helpful information in a new six-page leaflet on employment in travel bureaus. The title is Occupational Abstract No. 94 on *Travel Bureaus*. It covers the nature of the work, qualifications, and preparation required, methods of entrance and advancement, postwar employment trends, and sources of further information. Occupational Index, Inc., New York University, New York 3, N. Y.

♦ The U. S. Office of Education, Washington 25, D. C., announced recently the publication of its annual report for the fiscal year ending June 30, 1945.

The present 76-page report, issued as section two of the combined report for the Federal Security Agency, gives a brief panoramic review of the services and activities of the Office under the plan of organization existing during the final wartime year. It reflects the far-reaching relation of the war to the activities of the Office of Education and of the nation's schools, school systems, and colleges.

A considerable part of the report is taken up by an account of the activities of the vocational division during the fiscal year. War-training pro-

(Continued on page 31A)

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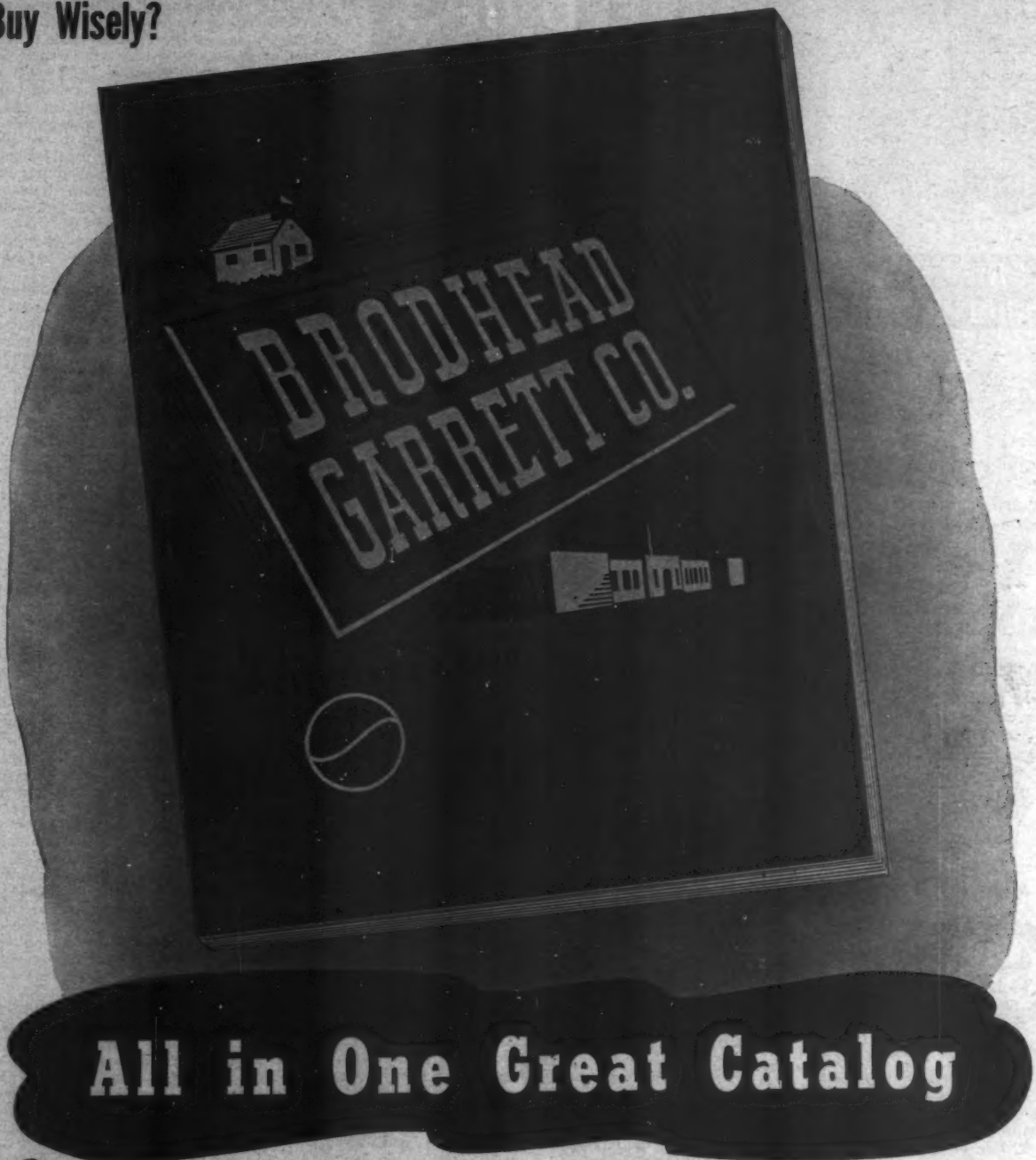

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GHIRARDI RADIO-ELECTRONIC BOOKS

(Continued from page 30A)

grams, co-operative programs, teacher training, research projects, and other details with which the various sections of this division were concerned during the year, are given consideration.

Copies of this annual report may be obtained by purchase at 15 cents each, from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

♦ The National Education Association has been awarded the Treasury's Distinguished Service Citation for its co-operation in the war finance and savings bond program.

More than 25 million pupils in 200,000 schools took part in the Schools-at-War program, Dr. Jarvis Morse, director of the Education Section of the U. S. Savings Bonds Division of the Treasury, said in presenting the citation during the annual convention of N.E.A. in the Memorial Auditorium, Buffalo, N. Y.

At the same time he presented the treasury's silver medal awarded to individuals for distinguished service in war finance to N.E.A. President Frank L. Schlagle, superintendent of schools in Kansas City, Kans., and to Willard E. Givens, since 1935 executive secretary of N.E.A. and prior to that superintendent of schools at Oakland, Calif.

♦ The Educational Research Service of the National Education Association has just issued a manual on "Teaching About Light and Sight." Classroom and shop teachers ought to get and study a copy of this manual on the importance of proper lighting.

♦ A co-operative research project between the Model Industry Association, Inc., and the Industrial Education Department of Texas Agricultural and Mechanical College, College Station, Tex., has been announced by Dean Howard W. Barlow of the School of Engineering.

Glenn M. Tindall, executive director of the Model Industry Association of Chicago, Ill., has just completed arrangements for the research project with Chris H. Groneman, acting head of the Industrial Education Department. Rogers Barton, model airplane designer and builder, and winner of many model airplane contests, is the member of the teaching staff of the college assigned to the project. Mr. Barton has been a member of the engineering drawing staff.

The research work will involve grading and evaluation of model airplane kits now on the market, and an effort will be made to standardize the available kits so they will be more acceptable to schools and recreational groups. It is hoped to devise courses of study for public schools in model aircraft design, construction, and flight.

The first stage of the co-operative research will take about four months, to be followed by other work along the same lines looking toward standardization of the model industry which, including airplanes, jeeps, trucks, trains, etc., accounts for a $50,000,000 per year volume of business. The model airplane field alone includes gliders, helicopters, and planes powered by rubber bands, gasoline motors, and radio controlled models.

♦ Through the co-operation of Hughes Fawcett, Inc., New York, there will be a special group of purchase awards offered for designs handwoven entirely of linen yarn and submitted to this year's International Textile Exhibition. This is an annual event sponsored by The Woman's College of the University of North Carolina, Department of Art, Greensboro, N. C.

Designs to be submitted may be for table linens or towels, for upholstery or drapery fabrics, or for dress or suit materials and may be done in either texture weaves or all-over patterns. While the design remains the property of the designer, the article or sample length submitted becomes the property of the sponsors. Four purchase awards will be made for woven linen textiles: first purchase award, $100; second, $75; third, $50; fourth, $25.

Entry blanks and further information on the design competition may be secured from Hughes Fawcett or from the Art Department, The Woman's College, University of North Carolina.

♦ The San Francisco Unified School District announces that the following instructional departments have moved their offices from 93 Grove Street to: 750 Eddy Street, San Francisco 9, Calif.: Bureau of Texts and Libraries, Margaret V. Girdner, supervisor (inc. Teachers' Professional Library and Visual Aids Department); Art, Archibald M. Wedemeyer, director; Typical Classes, Mrs. Nell V. O'Connell, supervisor; Child Care Centers, Marion E. Turner, supervisor; Industrial Arts, Charles E. Barker, director; Music, Charles M. Dennis, director; Physical Education, Ray Daugherty, director; R.O.T.C., Lt. Col. Thomas G. Bond, P. M. S. & T.; and Veterans' Counseling Center, Ward M. Nichols, manager.

♦ The Vocational Office Practice Class of Independence High School, Independence, Kans., under the co-ordinatorship of Ralph A. Dellinger has prepared an outline of suggestions to secretaries and office workers for personality development.

♦ A new 16-page booklet titled "Phosphors and Their Behavior in Television" has been announced by North American Philips Co. Inc., 100 East 42nd St., New York.

The text material was written by Irving Krushel, chemical engineer. It describes in detail the intricate chemical processes involved in the manufacture of high quality cathode-ray-tube screens.

The contents of the book is divided into the following sections:

General theory of fluorescence; manufacturing problems; chemistry of (*a*) sulphides, (*b*) silicate phosphors, and (*c*) tungstates; types of cathode-ray-tube screens; three essential C-R tube elements; building the screen by (*a*) spraying, (*b*) settling, (*c*) flowing, and (*d*) electrostatic deposition; properties of phosphors; effects of milling and temperature; gas absorption, secondary emission and phosphorescence; efficiency, brightness and color; phosphor objectives for projection television.

The booklet contains 8 photos and 12 graphs which make the text easy to understand. There is also a table showing specifications of the Radio

(Continued on page 34A)

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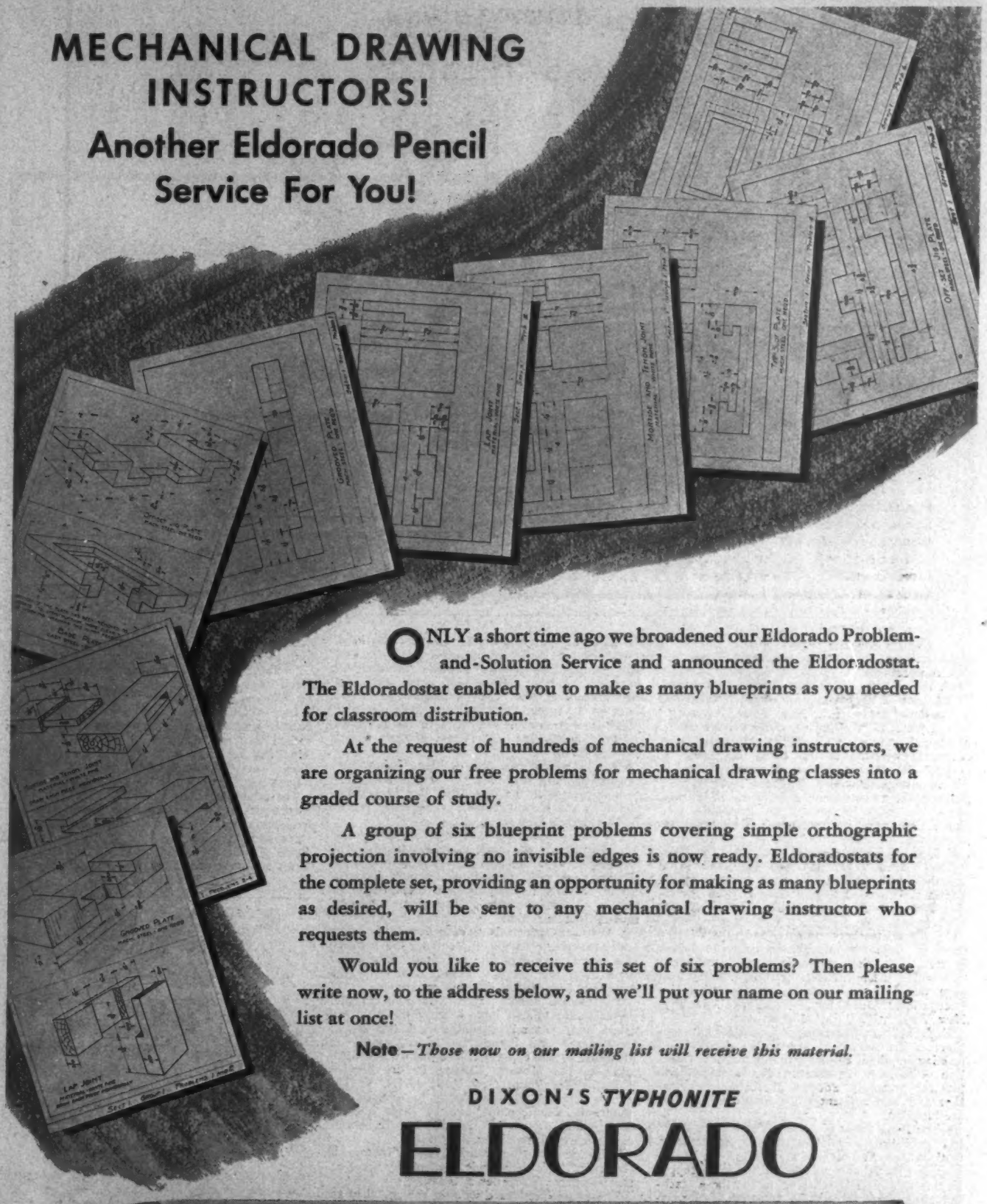

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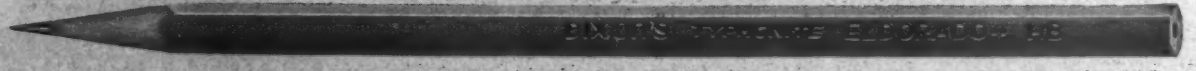

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(Continued from page 32A)

Manufacturers Association for eight types of C-R tube screens.

♦ A revised six-page leaflet, *Dental Technician*, by Florence L. Rome, has just been published by Occupational Index, Inc., New York University, New York 3, N. Y. Vital as advisory material to vocational counselors, ex-G.I.'s, students, and everyone interested in this field, the leaflet is available for 25 cents cash with order.

♦ An instrument called the Race Tester, which produces the measurement of waviness on bearing races, has been introduced by Physicists Research Company. The race tester is essentially a production instrument for use in race grinding and finishing departments.

The instrument is described in detail in a bulletin just published by the manufacturer. Copies may be had without charge from Physicists Research Company, Dept. 45, Ann Arbor, Mich.

♦ Students, teachers, parents, and others interested in obtaining information concerning jobs in recreation, photoengraving, and peace agencies, will find helpful facts in three different six-page occupational abstracts just published by Occupational Index, Inc., New York University, New York 3, N. Y., at 25 cents each.

Each abstract summarizes available information on the nature of the work, abilities and training required, earnings, number and distribution of workers, advantages, disadvantages, and postwar prospects. Sources of further information and best references for additional reading are included.

♦ The Department of Labor, Washington, D. C., has published a booklet titled "Employment Outlook for Automobile Mechanics." In it are discussed the labor demands and the labor supply in this field. It is good reading for those teaching automotive subjects in full-time, and part-time vocational schools.

♦ The National Safety Council has recently completed a sound slide film entitled "For You and Yours." The film dramatically describes the fast growing, nationwide safety movement and the part the National Safety Council, the local safety council, and other safety organizations play in it. The picture features Edward G. Robinson, motion picture and radio star, and the radio song trio, the Dinning Sisters. The narrator is Vincent Pelletier, radio announcer.

For further information write to the National Safety Council, Inc., 20 North Wacker Drive, Chicago 6, Ill.

♦ A new sound slide film entitled "Laboratory Glassware," and depicting the safe handling of glass apparatus in the laboratory, has been completed by the National Safety Council, 20 North Wacker Drive, Chicago 6, Ill.

The film stresses the importance of doing each job the correct way, and provides step-by-step illustration of techniques that result in greater efficiency, as well as avoiding accident hazards. An instructor's manual has been prepared as an aid to quizzes and group discussions following showings of the film.

♦ A feature which is finding favor in junior and senior high schools throughout the country is a sound motion picture on 16mm. film which dramatizes the use of brand names in the American competitive distribution system.

The motion picture called "Marks of Merit," presents in a human interest story the historical origin and economic significance of the use of trade-marks and brands by which goods are identified by the consumer. The picture is distributed by the Modern Talking Picture Service, 9 Rockefeller Plaza, New York 20, N. Y. The film is released without charge to schools, and applicants should name two or three booking dates when writing to the distributor, because of the heavy demand for the prints.

♦ The new Norton training films, "Lessons in Grinding," have been made available by the Norton Company, Worcester 6, Mass.

These films are loaned without charge. They are 16mm., Kodachrome films with sound and *cannot* be projected on a silent projector.

This series embraces: Cutter Sharpening; The Cylindrical Grinder; The Surface Grinder; The Grinding Wheel, Its Care and Use; Grinding Carbide Tools; Grinding Wheel Markings; and Grinding Wheel Safety. The running time varies from 14 to 30 minutes. For dates write to Norton Company, Publicity Department, Worcester 6, Mass.

♦ What is believed to be the largest single collection of educational and teaching films now available to schools and industries is fully described in a new catalog just published, and offered free to users of training films by Castle Films, Inc., distributors, 30 Rockefeller Plaza, New York City.

The catalog contains a complete list of all U. S. Government 16mm. sound films and 35mm. film strips, totaling 1158. They include 466 motion pictures and 432 film strips of the United States Office of Education, and training films and other types of educational films produced by the navy,

(Continued on page 36A)

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(Continued from page 34A)

War Department, Department of Agriculture, and U. S. Public Health Service.

♦ James A. Bohannon, president of Brewing Corporation of America, which he established on the foundations of the old Peerless Motor Car Corporation, presented the Peerless Collection of Early Automotive Literature to the Cleveland Public Library, on August 12, 1946.

The 770-volume collection contains one of the most complete existing chronicles of the industry's early years.

Including the leading British, French, and German, as well as American publications, the Peerless Collection embraces 467-volume years of automotive periodicals published prior to 1920. Among them, for instance, are the only known copies of certain early issues of the British magazine *Motor* which have been the object of a country-wide search by important companies supplying the automotive industries. Likewise, it includes a complete file of the German magazine *Motorwagen* from 1898 through 1906.

New Publications

How to Evaluate Supervisory Jobs

By Albert N. Gillett. Loose-leaf gold stamped fabrikoid binder, 141 pp., 8½ by 11 in. $7.50. National Foremen's Institute, Inc., Deep River, Conn.

A method for evaluating the job of supervision and evaluating the supervisor.

Part I of the manual describes the job-analysis rating-evaluation of supervision.

Part II presents a definite plan by which management can determine the weak and strong points of the supervisor.

Part III contains 22 blank printed forms which can be put to actual use for evaluating both plant and office personnel.

This Way Up

By L. E. "Cy" Frailey. Cloth, 229 pp., 5⅝ by 8½ in., illus., Published by American Technical Society, Chicago, Ill.

Vocational guidance counselors and school librarians will like this book full of sprightly philosophical sayings.

The author tells the "fellow in the mirror" just what is expected of him if he wants to win success. He also tells him "the things that keep men little" and "what makes some men big."

Art Metal Work and Jewelry

By Louis J. Haas. Paper cover, $2.50. Published by Louis J. Haas, 3 Gedney Terrace, White Plains, N. Y.

This is the fourth revised and enlarged edition of one of this author's self-instructional craft books. It contains about 1300 motion sketches of how to use tools in the making of 47 pieces of interesting art-metal projects.

Applied Drawing and Design

By E. H. Mattingly and Everett Scrogin. Paper, 232 pp., 8 by 10¾ in., illus. $1.28. The McCormick-Mathers Publishing Co., Wichita, Kans.

A very good course in lettering and drawing. It contains a large number of practical problems in geometrical constructions; a good section on measuring and dimensions; and chapters on views, shapes, and positions of objects; sketching, machine drawing; woodworking drawing; sheet-metal drawing; graphs, charts, and maps, inking and finishing drawings; tracing and blueprinting; and essentials of design and color.

Career Opportunities

By Mark Morris. Cloth, 354 pp., 6⅞ by 9¼ in., $3.25. Progress Press, 2153 Florida Ave., Washington 8, D. C.

A book containing occupational briefs on occupations in the fields of aviation, radio, building construction, house painting and decorating, factory-product painters, printing, machinist work, automobile and Diesel mechanics, stationary engineers, clerical occupations, professions, managerial occupations, agriculture, engineering, physical and natural sciences, medicine, social sciences, art, education, the ministry, selling, and municipal service occupations.

Pottery Production Processes

By J. J. Svec. Paper, 70 pp., illus., $2. Industrial Publications, Chicago 5, Ill.

A book of special interest to the manufacturer of pottery. It contains 19 chapters dealing with selection, mixture, and treatment of materials, firing processes, etc. While he uses the technical terms of the industry, the author has kept in mind the amateur craftsman.

New Careers in Industry

By John M. Amiss and Esther Sherman, illustrated by Sidney W. Seeley. Cloth, 227 pp., 5¾ by 8⅛ in. $2.50. McGraw-Hill Book Co., Inc., New York and London.

Written by a man who is the director of industrial education in a large industry, the reader is given a clear insight into the many opportunities that are open to the earnest beginner.

As the reader proceeds through this book he learns what the worker in various occupations and trades must know. He finds out what the laborer, the semiskilled worker, the mechanic, the planners, foremen, inspectors, and superintendents must do in order to get out a worthwhile product. He also learns what the designers, engineers, research men, sales promoters, labor-relations men, and public-relations men must do before the product comes into the hands of the consumer.

Instruction Programs, Vol. I — DoAll Machines, Tools, Gages

Cloth, 263 pp., 6 by 9 in., illus. Prepared by the DoAll Technical Institute, The DoAll Company, Minneapolis 4, Minn., and Des Plaines, Ill.

This book, covering the techniques of contour sawing and filing, is especially designed for instructing trainees in part-time and full-time vocational schools.

The book contains a program of instruction broken down into the work to be carried on in the classroom and in the shop. It also presents outlines for the teachers, lectures and demonstrations, and projects of various kinds, all of which are accompanied by grading guides which the instructor can follow in judging the student's work.

Helpful films and training aids also are listed.

Design in the Industrial Arts

By Charles B. Bradley. Cloth, 254 pp., 5¾ by 8⅝ in., illus., $3. Manual Arts Press, Peoria, Ill.

The author of this book presents a lucid explanation of the place of art in industrial design; how function, material, and the processes of construction influence design; and then proceeds into showing how to apply design in the school-shop problems that arise in printing, bookbinding, and leatherwork, woodwork, metalwork, plastics, textiles, and basketry.

He also discusses the arrangements of displays and design for the school stage.

Occupations

By Gertrude Forrester. Cloth, 240 pp., 6 by 9¼ in. $2.25. The H. W. Wilson Co., New York City

A newly revised edition representing a comprehensive guide to the ever growing pamphlet literature on vocational guidance.

Besides presenting the criteria used in compiling the bibliography, it shows how the annotations were prepared, gives instructions on how to index and file occupational pamphlets, and then explains the arrangement of the annotated bibliography so that it will be of greatest helpfulness both to the guidance personnel and to the one seeking vocational guidance.

Aircraft Drafting

By Hyman H. Katz. Cloth, 386 pp., 8⅜ by 11¼ in., illus. $5. The Macmillan Co., New York City.

This text is written by a man who has taught the subject and worked at it in industry. It

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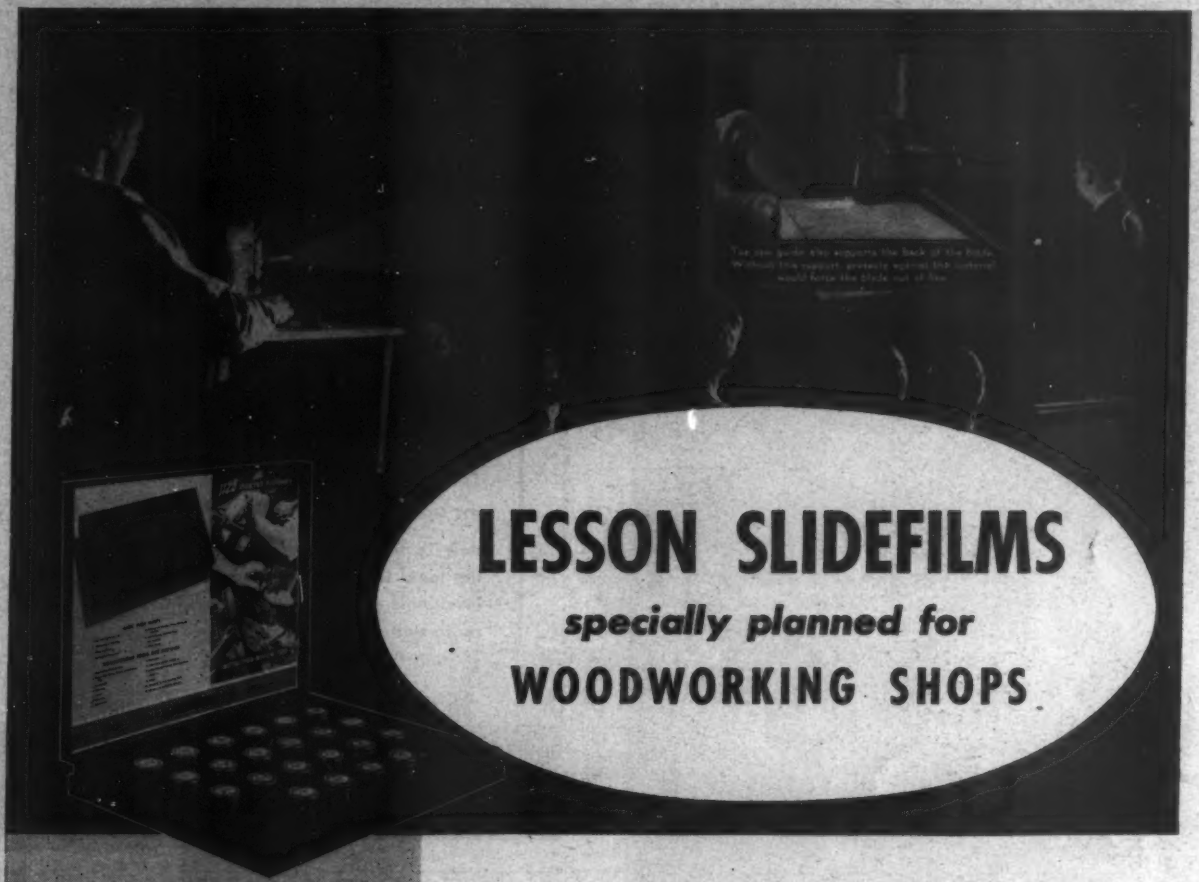

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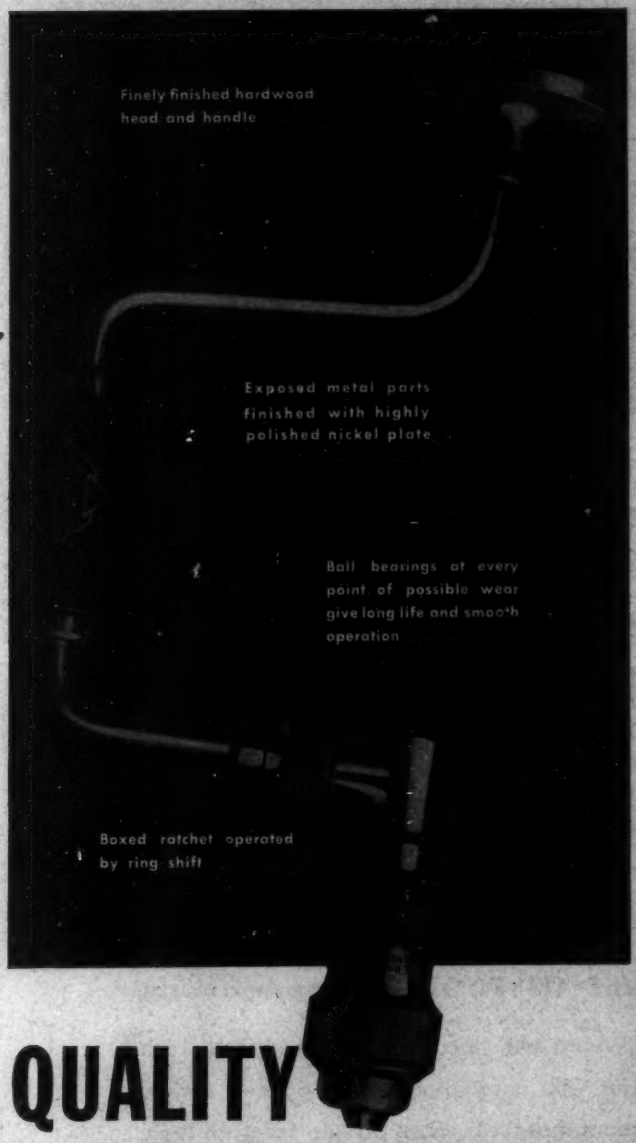
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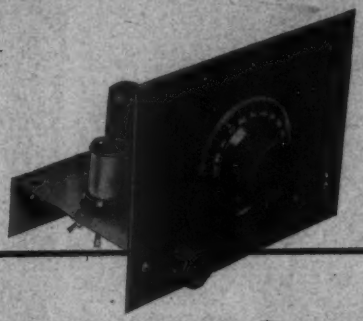

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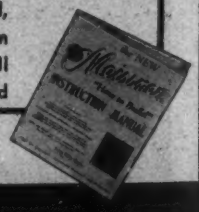

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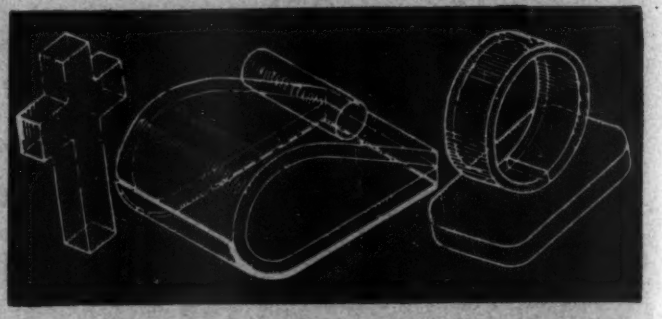

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(Continued from page 36A)

presents, therefore, both the pedagogic and industrial viewpoint.

It contains the nomenclature of the airplane in the introductory chapter, and then presents chapters and applied problems on geometry, orthographic projections, auxiliary views, sectional views, dimensioning, and pictorial drawing.

There also are chapters on the materials, machines, and processes, fasteners, parts, etc., used by the industry.

General Woodworking

By William H. Johnson and Louis V. Newkirk. Cloth, 283 pp., 8⅜ by 11¼ in., illus. $2. The Macmillan Co., New York City.

This book presents a brief story on the wood used by woodworkers and then enters into a description on how to use, condition, and care for the various types of hand and power woodworking tools. Then follow directions for making fifty well-designed projects of various kinds.

The book contains chapters on wood finishing, cabinetmaking, carpentry, wood turning, patternmaking, and wood carving.

There is also a very helpful chapter on the home workshop.

Shooting the Bow

By Larry C. Whiffen. Cloth, 386 pp., 8⅜ by 11¼ in., illus. $2. The Bruce Publishing Co., Milwaukee 1, Wis.

This book does just what its title indicates—it shows the beginner how to shoot the bow. It is written by a man who knows how to select good wood for making bows and arrows, and how to care for and use this equipment.

He also has taught the art of shooting the bow to many beginners and has coached many excellent archers.

A careful perusal of this well-illustrated book, plus practice will help anyone master good shooting techniques.

The book also contains an excellent collection of archery terms and their meanings.

AIRCRAFT SHEET-METAL WORK

ISADORE M. FENN
Chicago Vocational School
Chicago, Ill.

(Continued from page 66A of the March, 1946, issue)

Q. 123. *What tests may be used to distinguish between annealed and cold-worked or heat-treated material?*

Ans. Rockwell hardness tests. These tests are not satisfactory for alloy identification.

Q. 124. *What does the process of hardening aluminum alloys consist of?*

Ans. Heating, quenching, and aging.

Q. 125. *What is galvanized iron or zinc coated steel?*

Ans. It is black iron sheet thinly coated with zinc. Galvanized iron is employed mainly for the construction of tanks, etc., for use in the shop.

Q. 126. *What is tin plate?*

Ans. Sheets used in making tin plate are rolled from high quality iron or soft steel. The sheet is coated with molten tin and the coating is controlled in thickness by means of rolls. Sheet of this type is fully annealed and may be used for small containers, etc.

Q. 127. *What is terneplate?*

Ans. Terneplate is very similar to tin plate being iron coated with a mixture of tin and lead. Although commonly referred to as roofer's tin it has been used, in some instances, for fuel and oil tanks.

Q. 128. *Name some uses of copper in its commercially pure form.*

Ans. Copper is used in making gaskets, radiators, fuel and oil lines, etc. Several alloys of copper are employed for aircraft construction in the sheet form.

Q. 129. *What is sheet brass?*

Ans. An alloy of copper and zinc. The better grades of sheet brass contain approximately 75 per cent copper and 25 per cent zinc.

Q. 130. *What is Monel metal?*

Ans. Monel metal is a trade name for copper-nickel alloy, approximately 67 per cent nickel, 28 per cent copper, and 5 per cent other elements, chiefly iron and manganese. It is white malleable, ductile, and non-corrodible. This metal solders easily. Monel sheets are used for floats on seaplanes and for the manufacture of tanks, boxes, etc., where the metal is apt to come in contact with acids.

Q. 131. *Does riveting as applied to aircraft structures differ from the ordinary riveting of steel or iron?*

Ans. Yes. Aircraft riveting must always be done in a way to produce the greatest strength possible, and any distortion of the material must be avoided.

Q. 132. *Upon what factors does the selection of rivets depend?*

Ans. The job to be done and the location of the seam. In many cases where the rivets are to be subjected to shear stresses only, the appearance of the heads may well be the determining factor. Where it is possible that some tensile stress may be induced in the rivet a type of rivet should be used in which the height or thickness of the head is not less than one half the diameter of the rivet shank.

Q. 133. *Name the common types of solid shank rivets.*

(Continued on next page)

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BRIEF LOGAN SHAPER SPECIFICATIONS:
Length of ram travel, 7⅛" . . . strokes per minute, "Anyspeed," 64 to 175 . . . length of bearings, main frame, 10" . . . length of ram, 16⅛" . . . width of ram, 5" . . . table traverse, 10½" . . . table vertical travel, 5⅛" . . . table length, 8" . . . table width, 8" . . . table depth, 1½" . . . saddle bearing, 6" . . . toolhead travel, 2⅜" . . . toolhead swivel, 360° . . . toolhead diameter, 4" . . . Cross feeds, 6 (.002, .004, .006, .008, .010, .012) . . . Sprocket and chain drive . . . vise 5"x5"x1½" . . . motor, ½ hp, 1750 rpm . . . Height over all, 51" . . . Shipping weight, shaper, stand and motor, 535 lbs.
NEW LOGAN 7-INCH SHAPER
COMBINES EXTRA CAPACITY HEAVIER CUTS AND LASTING ACCURACY
The Logan Shaper is built by the same organization which engineers and builds the Logan Lathe. Quickly, easily set up, it handles a wide variety of work, straight cuts, angular cuts, squaring, machining, and slotting operations. All steel and cast iron, with extra weight at vital points, and rugged throughout, the Logan Shaper takes heavier cuts smoothly, with speed and accuracy, and without chatter. Extra heavy cast iron crank plate puts ample power behind every stroke. Positive, slip-proof operation, even on heavy cuts, further assured by roller chain drive. Maximum stroke of 7⅛" and any desired operating speed between 64 and 175 strokes per minute give the Logan Shaper capacity and versatility as well as accuracy. Speed can be changed instantly, without stopping motor or shifting belt. Ram is micro-set by a simple screw adjustment. Six automatic feeds in either direction from .002 to .012, with a half turn of feed handle reversing feed. Tool head may be swiveled and instantly re-set to center by means of tapered locating pins, an exclusive Logan Shaper feature. For full information on the Logan Shaper, see your Logan dealer or write for details. O-2
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(Continued from previous page)

Ans. (1) Round head; (2) Brazier; (3) Countersunk head; (4) Flathead.

Q. 134. *State the use of round-head rivets.*

Ans. This type of rivet is used in relatively thick sheets where strength is required. The size of the head is such that it covers sufficient area to strengthen the sheet around the hole and at the same time offers considerable resistance to tension.

Q. 135. *State the use of the brazier head type rivet.*

Ans. This rivet is used extensively for riveting of thin sheet (skin) exposed to the slip stream as it offers little resistance to the air. The large diameter of the head makes it particularly adaptable for use in thin sections.

Q. 136. *State the use of countersunk head rivets.*

Ans. This type is used for riveting thick sheets over which other plates must fit. Countersunk head rivets may also be used, in some cases, for riveting thin sheet exposed to the slip stream.

Q. 137. *State the use of the flat head type rivet.*

Ans. The flat head type of rivet is sometimes used for internal riveting where increased clearance is required.

Q. 138. *Name two special rivets used in aircraft construction.*

Ans. (1) Thompson steel tubular rivet — the portion of the rivet shank through the material is solid and is only drilled to a depth sufficient for heading or upsetting. For this reason, the lengths must be very carefully matched in relation to the thickness of the materials through which they go; (2) Goodrich rivnuts — rivnuts are threaded rivets and are used in places that are impossible to reach with a bucking iron.

Q. 139. *Name the two standard joints used in aircraft construction.*

Ans. The lap joint and the butt joint. Either types may be made with one or more rows of rivets.

Q. 140. *Is a large percentage of the riveting of airplane structures done on thin gauge aluminum alloy?*

Ans. Yes. The work must be so accomplished that the material is not distorted by hammer blows or injured with the riveting tools.

Q. 141. *How is most aircraft riveting done?*

Ans. By upsetting or heading the rivets against a bucking tool instead of striking the shank with a hammer.

Q. 142. *What must be done to prevent deforming of the rivet head?*

Ans. A rivet set must be selected to fit each type of rivet head. The depth of this set must be such that it does not touch the material being riveted.

Q. 143. *Why should parts riveted together be heat treated before riveting?*

Ans. Heat treating after riveting causes warping.

Q. 144. *Should rivets of a diameter smaller than 3/32 inch be used for any structural parts, control parts, wing covering, cowling, or similar sections of the airplane?*

Ans. No.

Q. 145. *What should the diameter of rivets be which go completely through hollow tubes?*

Ans. At least one eighth of the outside diameter of the tube.

Q. 146. *Should aluminum alloy rivets be used in tension for structural, control, or other critical parts of the airplane?*

Ans. No. Cadmium-plated rivets must be used.

Q. 147. *When is the use of hollow rivets in joining highly stressed parts permitted?*

Ans. When solid rivets cannot be driven because of the inaccessibility of the end for bucking or driving.

Q. 148. *Is the selection of the proper rivet length for the various operations very important?*

Ans. Yes. The rivets must be of the proper length for the total thickness of the pieces being riveted.

Q. 149. *What is the proper length of the rivet for the rivet shank to protrude through the material to form the head?*

Ans. Ordinarily from 1½ to 2 times the diameter of the rivet. For heavy material, such as plates or fittings, from 2 to 2½ diameters may be used. Where the two edges of the thin sheet are lapped and riveted together, about one diameter of the rivet will prove sufficient.

Q. 150. *May the rivet be a loose fit in the hole?*

Ans. No. This will cause the rivet to bend over while being headed and the shank will not be sufficiently expanded to completely fill the hole.

Q. 151. *How should pieces be held firmly together while they are being drilled and riveted?*

Ans. By clamps, screws, or bolts.

(Acknowledgment is made for the use of material contained in War Department Technical Manual T M 1-435.)

Accidents kill more persons from 2 to 28 years of age than any single disease. — *National Safety Council.*

Constance and Wesley Mueller, undersea explorer-photographers (and X-acto fans from 'way back!) snapped this picture of themselves with two of their special fish friends who follow them from reef to reef along the ocean floor! (Yes! That is a shark!)

THEY EXPLORE THE OCEAN FLOOR

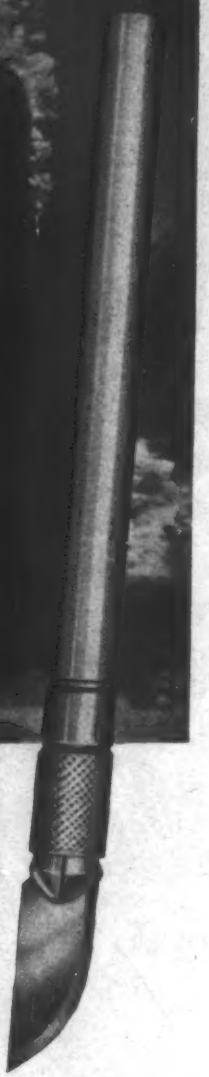
. . . and find a hundred uses for X-acto

THERE'S never a dull moment in the sea-going life of the Muellers. They run their own 40-foot cruiser, do their own diving, take their own photographs, and coax the "monsters" of the deep to pose for them.

In their laboratory, in designing and repairing their equipment, in preparing their photographs for publication, they "encounter a hundred jobs requiring implements for delicate as well as heavy cutting." And that's a hundred jobs for X-acto! In fact, say these exacting scientists, "X-acto Knives have now replaced a nondescript group of tools we formerly used, because we found them *stronger, safer, keener.*"

13 Blade Shapes Quickly Interchangeable!

Landlubbers, too, find X-acto Knives do their hobby and business cutting jobs, quicker, better and *easier.* With 3 *all-metal* handle styles (*No more substitute plastics!*) and 13 different blade shapes, X-acto is always scalpel-sharp, always ready. Amateurs or experts . . . whittlers, model builders, sculptors in paper, wood or plastics . . . choose X-acto for fun *and* best results.



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Shop Equipment News

New Products—Publications

HANDLEVER TURRET FOR 9-IN. LATHES

This new tailstock-type Handlever Turret is designed to give turret lathe efficiency to 9-in. South Bend Lathes on jobs which require a number of successive operations.

The turret mounts on the inside ways of the bed in place of the tailstock. Its head accommodates tools with 5/8-in. diameter shanks. The length of the cut at each station is regulated by means of an adjustable set screw. Stop mechanism

Handlever turret for 9-in. lathes

is geared to operate automatically in unison with the indexing of the turret head. The index lock releases automatically at the end of the turret slide's return stroke and indexing is done by hand. Operations can be repeated, or skipped, at will. Turret slide has a maximum stroke of 3¼ in.

Further mechanical data, and information about prices and delivery, can be obtained by writing direct to the South Bend Lathe Works, 178 East Madison St., South Bend 22, Ind.

For brief reference use IAVE—1710.

NEW SPRAY LUBRICATOR FOR BAND SAWS

A clean method of heat dissipation is announced by the DoAll Company, Minneapolis, Minn., with the introduction of a Spray Lubricator for attachment on their high speed band saws.

The use of this new device permits faster cutting rates, improves the finish, and increases saw life. The attachment is simple to install and is a rugged, heavy duty, foolproof device. It operates from the standard air pressure line available in the average shop.

The spray head straddles the rear of the saw blade and directs twin streams of lubricated air against the teeth of the saw. Lubricant is thus forced under pressure in the form of a fine mist into the saw teeth as it enters the work. Use of coolant is regulated by a metering valve. The worktable does not get wet or messy.

Spray lubricator for band saws

The DoAll Spray Lubricator has been designed primarily for use in cutting nonferrous metals, but works equally well on many types of plastics and laminated material where friction between blade and work softens the material to a gummy state.

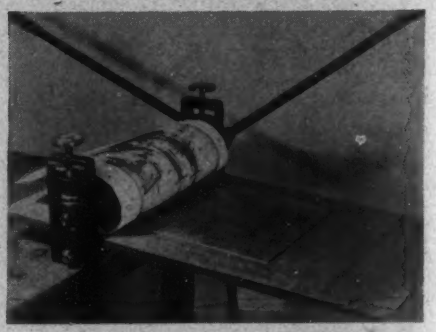
Further information on the Spray Lubricator may be had by writing the DoAll Company, 1301 Washington Ave. South, Minneapolis 4, Minn.

For brief reference use IAVE—1711.

A VERSATILE HAND PRESS

The Laszlo Universal Hand Press is again available for civilian use.

This portable hand press possesses almost universal usefulness in the field of the graphic arts. It can be used for type, woodblock, linoleum, stone, and metal lithography, etched and dry point plates, plastic dry point, photoengraved cuts, as well as collotype plates and bromoil.



Laszlo press printing an etching

When in operation the press is clamped to the edge of any sturdy table, and after it has served its purpose, it takes but a few moments to dismantle it and pack it into two carrying cases which can be handled by one person.

The Laszlo Universal Press has the following features:

1. Simple transfer of design from paper to plate.
2. Prints all thicknesses, from metal and plates to blocks and stones.
3. Will print on fabrics as well as on paper.
4. Offset duplicating of plates and blocks for color.
5. High pressure for etchings and lithographs.

Photographers will be interested to note that the Laszlo Press will produce small or large quantities of photo-enlargements in black and white or color, at very low cost, if standard film or the special Laszlo film is used as a printing plate in the collotype manner.

For further information address Rembrandt Graphic Arts Co., 165 East 60th St., New York 22, N. Y.

For brief reference use IAVE—1712.

MODEL NO. 333 LABORATORY TESTER

Reiner Electronics Company, Inc., have introduced a new unique "Volt-Ammeter," specially designed for use in laboratories, general service testing, and schools as well as by amateurs.

The outstanding feature is that when measuring voltage or current, the user connects the individual shunt or multiplier into the circuit manually and immediately visualizes the specific circuit connection and range. Such an arrangement permits a far greater variety and flexibility of ranges than are available in the average multitester. A built-in drawer holds a supply of coded shunts and multipliers, as well as fuses for easy replacement.

(Continued on page 44A)

FAVORITE OF THE FURNITURE FACTORIES

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HERE'S WHY

The ancient Egyptians relied on animal glue. Examples of their wood craftsmanship are on exhibition today in Cairo, age-old, proof animal glue is strongest, holds the longest.

With Franklin you can do away with messy glue pots, for Franklin is used right from the can—AS IS! No unpleasant odor.

Franklin is fine for beginners because it eliminates chilled joints. The stronger, thinner glue line preserves the beauty of the grain and saves tools.

The fire hazard is eliminated with Franklin Glue because no heating is involved. It's ready to use, won't get sour or evaporate.

With class time short, Franklin makes it possible for your students to do more and better work. Always ready to use—cold on cold wood.

Leading wood craftsmen use Franklin Liquid Hide Glue. It's the standard in the wood-working industry.

No waste, just pour unused glue back in original container.

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(Continued from page 42A)

The meter is hermetically sealed to insure permanent accuracy and stable operation. An additional safety factor is a meter fuse to protect against burnout.

The meter is guaranteed against defects for a period of ten years.

The meter, shunts, and multipliers are accurate to 1 per cent. Voltage multipliers will give a range from 1 to 1000 volts and shunts a range from 2.5 milliamps to 10 amperes.

For further information, write to the Reiner Electronics Company, Inc., 152 West 52nd Street, New York 1, N. Y.

For brief reference use IAVE—1713.

NEW CINCINNATI NO. 2 MI MILLING MACHINES

A new medium sized knee-and-column type milling machine, incorporating many unique and noteworthy features, has been announced by The Cincinnati Milling Machine Company. Designated their No. 2 MI, the machine is powered by a 5 h.p. motor.

These machines offer important advantages in producing small to medium-sized parts. Many features, such as quick and easy speed and feed changes through crank type controls, give them an exceptionally high value in the toolroom, while the live rapid traverse and high spindle speeds and feed rates make them equally useful in production shops. There are many other interesting features. A brief outline of them, and what they mean in low cost production and convenience of operation will be furnished upon request. Literature on all styles of No. 2 MI milling machines may be obtained by writing to The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

For brief reference use IAVE—1714.

FLEXIBLE SHAFT UTILITY TOOL

A handy, portable Flexible Shaft Utility Tool, capable of getting into small corners and tight places, is now being produced by The Dumore Company, Racine, Wis.

It weighs but 8 pounds, and its 1/15 h.p. motor needs only to be hung on any convenient hook, connected to an outlet, and the shaft is ready to operate.

This Flexible Shaft Utility Tool is equipped with a No. 0 balanced Jacobs chuck to handle all drills, grinding wheels, buffers, and countersink bits with shanks of ⅛-in. diameters or less.

The shaft is 36½ in. long, and the normal speed for the handpiece is 500 to 3000 r.p.m., at gear reduction end. If desired, power may be taken off the other end of the motor for direct drive speeds of from 3000 to 10,000 r.p.m. Speed is controlled by a handy foot rheostat.

For brief reference use IAVE—1715.

NEW ALL-BRONZE GEAR PUMP

A new all-bronze gear pump, which can be used for pumping water, oils, solvents, salt solutions, chemicals, and other liquids of corrosive or noncorrosive nature, which do not affect bronze, is announced by Gray-Mills Corporation of Evanston, manufacturers of pumping units and parts cleaning systems.

The "GB" Series, as these units are called, are machined to close tolerances with precise gear construction for high performance efficiency. They have bronze housing, bronze gears, stainless steel shaft, 3 Oilite bearings, built-in pressure relief valve, and have an alemite fitting for lubricating the gear shafts. They have a maximum pressure of 300 p.s.i.; at 1750 r.p.m., volume is 6 g.p.m. Discharge is ½ in.

For further information write to Gray-Mills Corp., 1948 Ridge Ave., Evanston, Ill.

For brief reference use IAVE—1716.

NEW MICROWAVE EQUIPMENT

New lightweight microwave equipment, including an oscillator and hand intensity meter for a study of practically all of the phenomena of electromagnetic radiations at an ultrahigh radio frequency, has been announced by the Specialty Division of General Electric Company's Electronics Department at Syracuse, N. Y.

Designed for schools and radio instructors as a part of the Division's electronic educational line, the equipment weighs only four pounds. It also will be of interest to radio amateurs for microwave communication as it operates on a new "ham" frequency. By using reflectors and other apparatus, fundamental characteristics of radar and light may be observed by simply plugging the device in a wall circuit.

Further information on the new microwave equipment is available on request from the General Electric Specialty Division, Wolf Street plant, Syracuse, N. Y.

For brief reference use IAVE—1717.

NEW RESISTOR COLOR CODE GUIDE

Allied Radio Corporation announces the release of their new RMA-JAN Color Code Guide for radio and electronic type resistors. It is simple to operate. Three rotary disks are provided for setting the code colors and corresponding resistance values which are brought into alignment automatically. Code colors may be set to show corresponding resistance values, or resistance values may be set to show corresponding colors. It includes data covering resistance tolerance and complete listing of RMA-JAN 10 per cent resistor stock values. It saves time and prevents errors for students, experimenters, servicemen, amateurs, maintenance men, engineers, etc. Available at a price of 10 cents from Allied Radio Corp., 833 West Jackson Blvd., Chicago 7, Ill.

This firm also has issued a very complete 1946 catalog which is a very complete buying guide for things pertaining to radio and electronics.

For brief reference use IAVE—1718.

NEW FLUX-COATED BRONZE WELDING ROD

A new flux-coated bronze welding rod for application by the oxyacetylene process has been developed by The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation. This new rod combines all the properties of the familiar Oxweld No. 25M. bare bronze rod with correct fluxing. When the rod is made, it is precoated with flux in proper proportion to its size. This coating consists of Brazo Flux plus a nonactive binder that does not affect the weld. The flux adheres firmly to the rod, melting

(Continued on page 46A)

In Tune with the Times!

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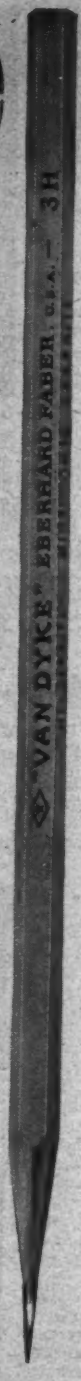

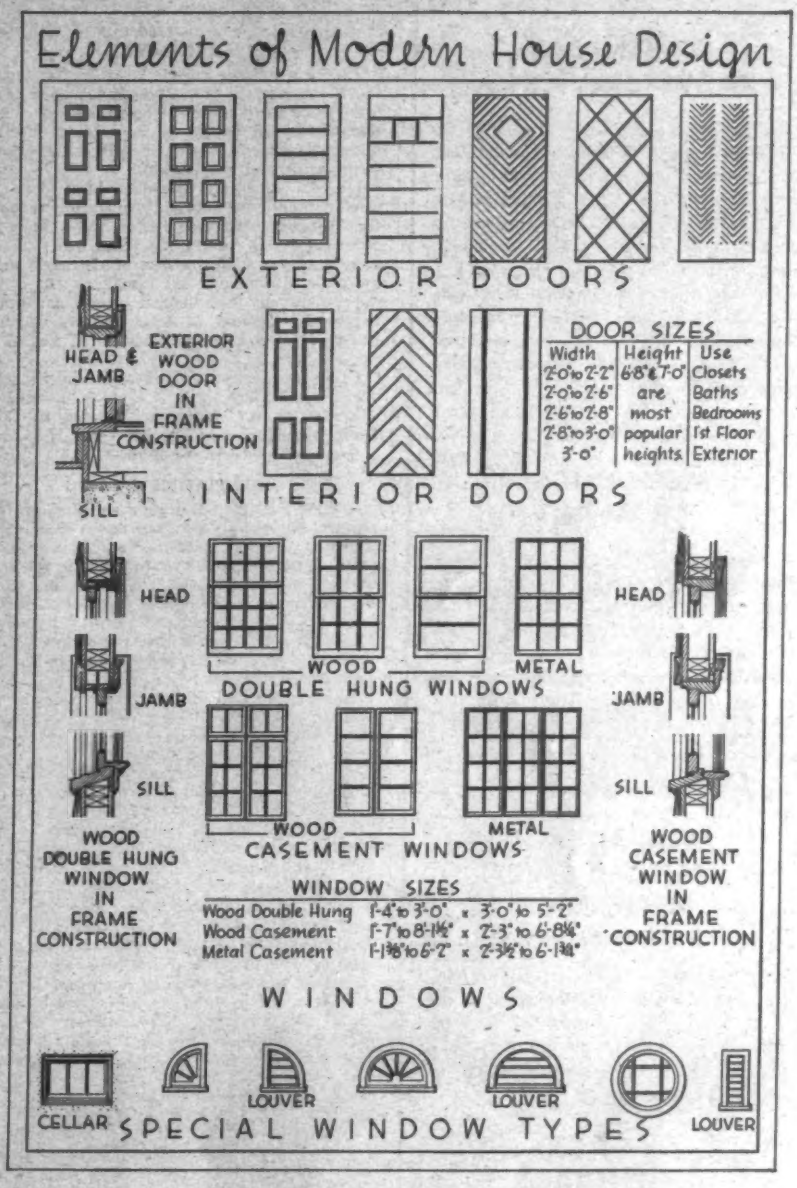
Elements of Modern House Design
EXTERIOR DOORS
HEAD & JAMB
EXTERIOR WOOD DOOR IN FRAME CONSTRUCTION
SILL
INTERIOR DOORS
DOOR SIZES
Width | Height | Use
2'-0" to 2'-2" | 6'-8" & 7'-0" | Closets
2'-0" to 2'-6" | are | Baths
2'-6" to 2'-8" | most | Bedrooms
2'-8" to 3'-0" | popular | 1st Floor
3'-0" | heights | Exterior
HEAD
JAMB
SILL
WOOD
METAL
DOUBLE HUNG WINDOWS
WOOD DOUBLE HUNG WINDOW IN FRAME CONSTRUCTION
CASEMENT WINDOWS
WINDOW SIZES
Wood Double Hung 1'-4" to 3'-0" x 3'-0" to 5'-2"
Wood Casement 1'-7" to 8'-1½" x 2'-3" to 6'-8⅛"
Metal Casement 1'-3⅜" to 6'-2" x 2'-3½" to 6'-1⅜"
WOOD CASEMENT WINDOW IN FRAME CONSTRUCTION
WINDOWS
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SPECIAL WINDOW TYPES

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1A-10

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✓ 1946 BOOKS

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WELLMAN

This new book, to be published in November, covers all types of radio service. It is especially prepared for vocational school students. Steps are described in a how-to-do-it fashion, and the related theory is simplified as far as possible. There are job sheets for major topics, and over 200 diagrams. Questions and reference lists follow each chapter. This is a workable book that a beginner can use to locate readily most radio troubles.

●

MECHANICAL DRAWING

NICHOLSON

Published this month! This thorough, practical text grew out of the author's work at the Ford Trade School. It gives a complete groundwork in the principles of mechanical drawing, with emphasis on modern machine design. Unusual number of illustrations, fascinating problems, detailed instructions.

●

ELEMENTS OF AUTOMOTIVE MECHANICS

HEITNER, SHIDLE, AND BISSELL

The 1946 revision of this well-known basic text covers all new developments in the field. The book is largely self-teaching, and requires no previous technical training. Excellent illustrations; summarizing review.

●

GENERAL METAL WORK

GRAYSHON

This new edition (1946) includes all up-to-the-minute practices. New illustrations show exactly how the work is done. Practical hobby projects stimulate interest. This is a correlated course of elementary sheet metal and light machine work. Exceptionally easy to follow and to teach.

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(Continued from page 44A)

down into the molten puddle without burning off ahead of the rod. The rod can be heated and bent without destroying the coating. In addition, the coating is not affected by weather conditions.

For further information address The Linde Air Products Co., 30 East 42nd St., New York 17, N. Y.

For brief reference use IAVE—1719.

CATALOG ON DIE-LESS DUPLICATING MACHINERY

The new edition of the Di-Acro Catalog No. 46–10 summarizes the developments which have been made in "Die-Less Duplicating" during the war years, and which are now being effectively diverted to the channels of peacetime development work and production.

Di-Acro Precision Machines have been continually improved and their operating range has been greatly increased since they were first offered on the market six years ago. Complete descriptions and illustrations of the latest models are given throughout this catalog.

Page 12 of this booklet shows an unusual application of two Di-Acro Benders which are being operated simultaneously for a special production job.

Other applications of these flexible machines also are described.

Write for this interesting catalog to O'Neil-Irwin Manufacturing Co., Minneapolis 15, Minn.

For brief reference use IAVE—1720.

NEW PLASTICS CATALOG

The new Plastics and Plywood Catalog No. 8, recently issued by Carmen-Bronson Co., 165 East Third St., Mount Vernon, N. Y., fully describes the materials marketed by this firm in the way of sheets, rods, and tubes, in clear and colored Plexiglas, Lucite, Vinylite disks, Bakelite cast resins, Tenite tubes and strips, Polystyrene, Lumarith sheets, Vinyl film, and supplies, such as findings, dyes, cements, and cleaning and polishing supplies.

The catalog also contains eight pages of offerings on various types of plywood.

For brief reference use IAVE—1721.

HANDICRAFT CATALOG

A four-page announcement describing plain and colored plexiglas in sheets, bracelet blanks, calendar and memo pad stands, and crystal in sheets, cylinders, bracelet blanks and tubes, has just been issued by American Handicrafts Co. Inc., to act as interim substitute until the 1946 catalog can be published.

Books on plastics, tools and accessories, leathers, leather and plastic face, leather craft supplies for making coin purses and link belts, also are listed.

For information write to American Handicrafts Co. Inc.: Mail orders—45–49 South Harrison St., East Orange, N. J.; retail only—12 East 41st St., New York 17, N. Y.; West Coast, mail order and retail store—915 South Grand Ave., Los Angeles 15, Calif.

For brief reference use IAVE—1722.

"PRODUCTION TALKS BACKSTANDS"

"Production Talks Backstands" is a booklet that answers the question, how can backstands boost our grinding and finishing production? Factually written from field engineers' case reports on backstand installations in seven diversified industries, it permits accurate appraisal of backstand adaptability by direct comparison.

A copy of this booklet may be obtained by writing to Behr-Manning, Division of Norton Company, Troy, N. Y.

For brief reference use IAVE—1723.

PICTORIAL DRAFTING MADE EASY

The principles of pictorial engineering drafting, as utilized in isometric and dimetric projection, are explained clearly and concisely in a 20-page illustrated booklet written by Paul F. Boehm and available without charge through the John R. Cassell Co., Inc., 110 West 42nd St., New York 18, N. Y. In addition to illustrating and explaining the fundamentals of isometric and di-

(Continued on page 49A)

Smooth, steady power at your fingertips! Ideal tool for hobbyist, repairman, mechanic, novice or craftsman. Works on wood, plastic, metal, alloy, glass, leather, horn, stone, etc. 25,000 r.p.m. AC or DC. Wt. 12 oz.

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Inquiries from wholesalers and jobbers solicited

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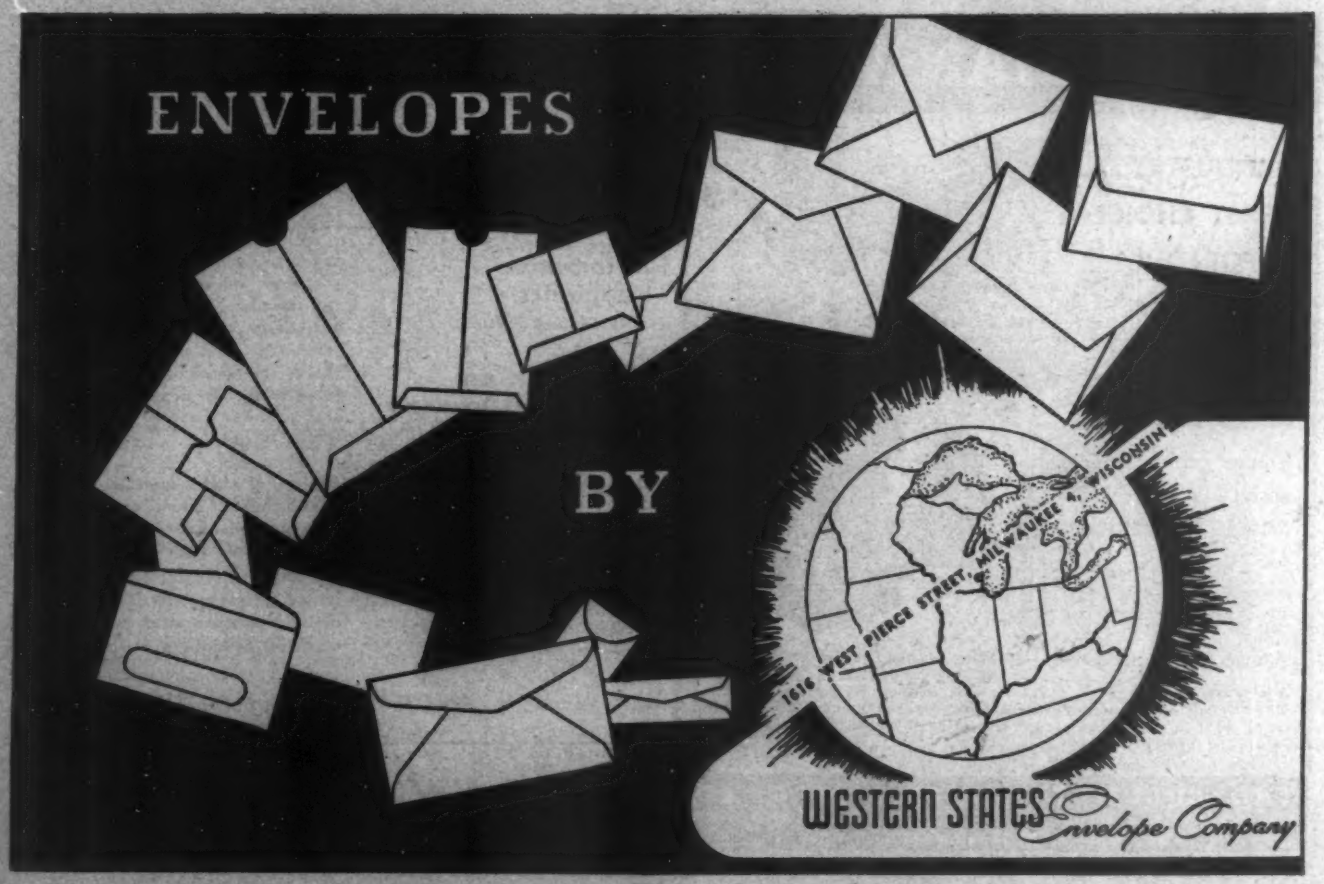

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We manufacture over forty types and sizes of electric kilns. All Weldon kilns are strongly made, the result of years of actual use. Fronts and backs cast metal. RIBBON ELEMENTS: built for continuous use.

Tell us the type of pottery you make and we will help you select the proper type and temperature kiln. Art pottery is made at less than 2000F. Stoneware and porcelain may be made at less than 2200F.

Size Inside Baking Chamber Wide	High	Long	Prices F.O.B. 2315 Harrison	2000F Cone 04	2200F Cone 6
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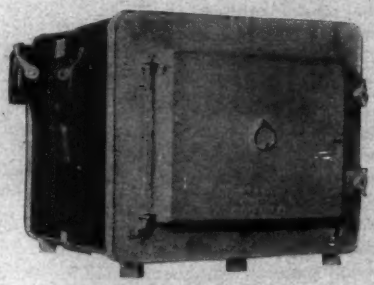
18	x 15	x 24	Bench Type	425.00	475.00
15	x 18	x 24	Bench Type	425.00	475.00
18	x 24	x 36	Cabinet	790.00	890.00



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WE JUST COULDN'T resist pulling out one of our early textbooks, The Compendium of Drawing, published almost fifty years ago. We compared it with one of our 1946 textbooks and couldn't help but see the difference. Like industry as a whole, vocational textbook publishing has made enormous strides.

PUBLISHING AN American Tech book is an art with us. It's more than organizing, illustrating, and attractively packaging instructional material that's been tested over and over. It's a research project as well.

WE'RE ALWAYS on the lookout for authors. Sometimes they have a manuscript; but more often they have only an outline or an idea—plus the ability to develop a textbook. We get them to write it—to our specifications. We base these upon the latest developments in industry and business and upon the needs of vocational education. As a result every American Tech book must represent a contribution to vocational education.

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5. Automobile Engines: Kuns-Plumridge. *Engines, carburetors and cooling systems* 4.75
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8. Machine Shop Work: Shuman. *Custom-built for your machine shop course* 3.50
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AMERICAN TECHNICAL SOCIETY

Please send the books as circled below for 30 days examination. If any of the books are adopted and 12 or more copies ordered, I will retain the adopted book as a desk copy; otherwise I will return them, or remit less the educational discount. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

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School .....

School Address .....

Detroit Public Library

Drexel Avenue at 58th St.
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AMERICAN TECHNICAL SOCIETY

(Continued from page 46A)

metric drawings, this new treatise also gives complete details of the new "Instrumaster" Stencils which have been especially developed to make the construction of isometric and dimetric drawings not only faster and easier than possible with conventional methods, but more accurate as well.

Mr. Boehm's booklet is entitled "Axonometric Drawing . . . The Universal Picture Language."

For brief reference use IAVE—1724.

NEW MULTIPLE V-BELT DRIVE BOOKLET

"How the Dominant Drive Speeds Production, Reduces Costs" is the title of a 16-page, illustrated booklet recently published by the Multiple V-Belt Drive Association. The booklet describes the engineering features of the Multiple V-Belt Drive in simple terms under separate chapters on "Delivered Horsepower," "Drive Durability," "Adaptability to Fluctuating Production Schedules," "Savings in Man-Hours and Shop Space," and "Economy of Installation and Maintenance." It is available on request, without charge, from the national headquarters of the Multiple V-Belt Drive Association, 22 West Monroe St., Chicago 3, Ill.

For brief reference use IAVE—1725.

RECEIVES CERTIFICATE OF MERIT

Cyrus E. Wood, personnel director of E. C. Atkins and Company, saw manufacturers of Indianapolis, Ind., has been awarded a certificate of merit by the Congress of the United States in recognition of his outstanding work as a member of the Advisory Committee of the Selective Service System of the State of Indiana.

For each local board the government appointed a man to serve as re-employment committeeman to work in connection with the board's secretary in placing returned veterans in their former jobs with proper status, pay, etc., or if that job was nonexistent on the veteran's return, to help him find other suitable employment.

EQUIPMENT AVAILABLE NOW

The Motor Generator Corp., Troy, Ohio, a division of The Hobart Brothers Company, has just released a brochure covering a preview of the MGC Products that are being offered for postwar sales. It includes new equipment developed during the war years 1941–45.

To give a better idea of the scope of this equipment and its applications, here are some of the important features:

High voltage MG sets ranging from ½ through 20 KW; battery charging and electrical testing sets, 5 to 20 KW generators for waste recovery and metal plating; metal coloring and finishing machines, motorized lift trucks for handling materials; low voltage MG sets for cadmium, nickel, hard chrome, zinc, and other types of plating; and equipment for charging railway coach and pullman car batteries; MGC 5, 10, 15, and 20 KW gasoline engine driven a.c. power units, and 10, 20, 30, and 60 KW diesel engine units; and buffers and grinders.

A folder describing the foregoing will be sent free by the manufacturer to those who request one. Ask for folder DM–704.

SWEPSTON JOINS AMPRO CORPORATION

The Ampro Corporation, 2835 N. Western Ave., Chicago, Ill., announces the appointment of Gene F. Swepston, recently discharged from the Army Signal Corps, to their educational department, where he will assist Ervin N. Nelson, director of educational sales, in co-ordinating educational and sales ideas from the educator's standpoint.

PLYWOOD AND PLASTICS BULLETIN

The Carmen-Bronson Co., distributors of plywood and plastic products, have issued a catalog with prices effective February 1, to June 15, 1946, covering a variety of plywoods of various thicknesses and sizes; odds and ends of a variety of solid woods, moldings, dowels, glues, and finishes.

The plastics bulletin lists assortments of clear and colored plexiglas and lucite in sheets, rods, tubes; cement, thinner, dyes, and plastic jewelry accessories and findings.

Write for this catalog to Carmen-Bronson Co., 165 East Third St., Mount Vernon, N. Y.

BOB STUCKER APPOINTED SALES MANAGER

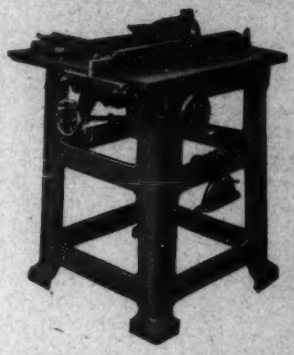
R. C. (Bob) Stucker, associated with the Brodhead-Garrett Company for 18 years, 15 of which were spent as district manager of the eastern states with headquarters in Hartford,

R. C. Stucker

Conn., was promoted to the position of sales manager of his firm on June 1, 1946. He is now in the home office of the Brodhead-Garrett Co., 4560 East 71st St., Cleveland 5, Ohio.

Ed Lyman, Jr., who represented the firm for many years in Illinois, Iowa, Wisconsin, and Minnesota, will now take over the position previously held by Mr. Stucker.

WALLACE
"MACHINE-OF-THE-MONTH"



No. 11
UNIVERSAL SAW

Direct Gear Drive. Motor raises, lowers, tilts — table remains horizontal. Micrometer rip fence for fast set-ups and close work. Two mitre gauges, adjustable for accuracy and wear. Motors to 2 H.P.

Here's a variety saw with value *plus* — a precision unit for accurate work, with extra capacity for those hard-to-handle jobs.

It has power, speed, stamina. Blades up to 11" cut 4" deep. Cross-cutting capacity, 14". Ripping capacity, 12", 24", 36" or 48". Quality materials guarantee long, trouble-free service.

Write today for bulletins. We also manufacture high-grade bandsaws, jointers, cut-off saws, mortisers, lathes, shapers, grinders, glue pots, etc.

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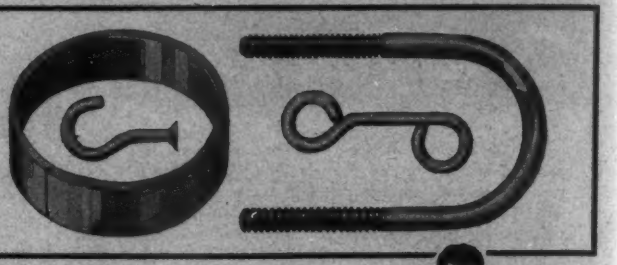

Students Learn Production Forming Methods with

DI-ACRO BENDERS

DI-ACRO Bender No. 2 forming steel tubing

Thousands of DI-ACRO Benders are in regular production use forming a great variety of small parts of manufactured products. Your students can learn to duplicate parts accurate to .001" in tubing, angle, channel, flat, round, or square materials with these precision machines.

Send for Catalog "Die-Less Duplicating"
which fully describes and illustrates all models of DI-ACRO Benders, Brakes and Shears.

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING ← Pronounced "DIE-ACK-RO"

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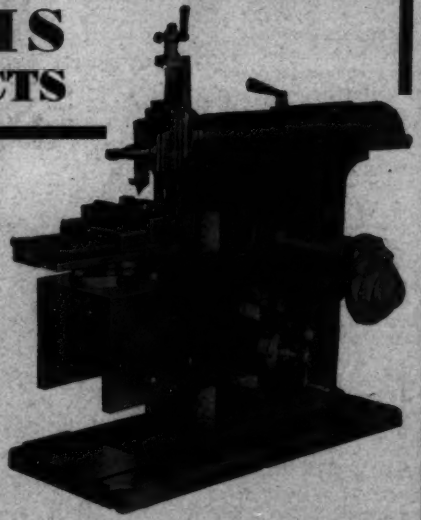
LEWIS PROJECTS



The skillful machinists of tomorrow are receiving their initial training today with Lewis Projects. Developed to give sound training in machine tool fundamentals and accuracy in workmanship, they are furnished in rough or semi-finished castings with necessary assembly blueprints. Completion and assembly enable schools to equip their shops economically and give students the "know how" of machine tool construction and operation.

Lewis Projects are available in shapers, mills, jointers, circular and band saws, etc., at extremely low prices. Savings are as high as 80% of usual costs of comparable finished tools.

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Accurately made Band Saws of extreme toughness enables more work to be produced in less man hours.

All sizes are carried in stock for prompt shipment.

Exclusive Band Saw Manufacturers.

PARAMOUNT SWEDISH BANDS
ACCURATELY SPACED TEETH
NO CRUSHED POINTS—GUARANTEED

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Safe, easy to operate . . . handles a wide range of mortising or boring

This "Oliver" Mortiser is ideal for use in the school shop. Cuts smooth, clean, accurate mortises. Handles wide capacity of work. Has compound table adjustable to any angle. Adjustments quickly made at motor head and table. Has latest safety features. Sturdily built for years of continual use.

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OLIVER MACHINERY COMPANY

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Easy Does it!

WITH POWERFUL PRESSES THAT NEED NO POWER

MODEL W MODEL 6C

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Famco Foot Powered Squaring Shears will cut up to 18 gauge mild steel with ease, accuracy and speed. Ruggedly constructed and available in five sizes.

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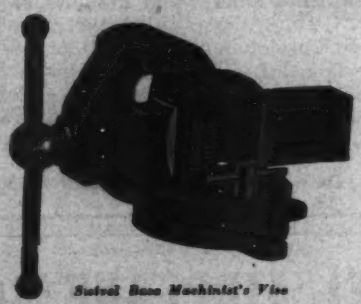
SQUARING SHEARS • ARBOR PRESSES • FOOT PRESSES

MORGAN VISES

SAFE • STRONG



Swivel Base Machinist's Vise

Today more than any other time, getting the most and best results is the important thing. In all of your school shops vises play an important part in the training of men and boys who learn by doing. Be sure your woodworking, metalworking shops are Morgan Vise equipped because this will mean many years of satisfactory, trouble-free service.

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HARGRAVE *CLAMPS*

Hargrave Clamps are Individually Tested to insure long life and dependability. Each Clamp is tested on our power-driven hydraulic Clamp Tester which can apply loads up to 30,000 lbs. As a result, Hargrave Clamps give lasting service despite toughest use. Illustrated above are three popular Hargrave Super Clamps (from left to right: No. 44, No. 42, No. 40). Frames are forged by our patented process from extremely stiff steel, and are heat-treated to prevent bending of screw and battering of threads.

WRITE FOR CATALOG

showing the complete line of Hargrave Clamps—sizes range from ¾ in. to 10 ft. openings, from ½ in. to 16 in. deep; also Chisels Punches, File Cleaners, Brace Wrenches, Washer Cutters, etc.

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WOODWORKING TOOLS— HARDWARE AND SUPPLIES

"The House of Service"

Postwar reconversion is now in full swing, but we still are far from being able to obtain normal supplies of merchandise. However, our orders have been placed and we look forward to the near future when we will again be able to fill your order promptly and complete as in the past.

Therefore, until complete stocks can be obtained, we suggest, when writing orders, that you include a second choice, if possible. This cooperation would be to our mutual advantage in shipping your order more promptly.

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CLAMPS

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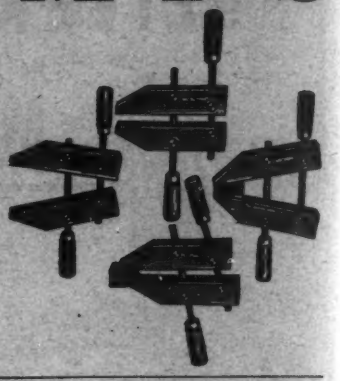

Genuine "JORGENSEN" Handscrews are the ones which will withstand "school shop service." To avoid future disappointment, be sure you ask for and get the genuine "JORGENSEN" every time.

They cost no more than any others.

Ask for them by name.

Write for No. 16 General Clamp Catalog

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"The Clamp Folks"
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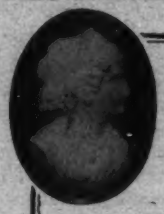

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CATALIN—PLEXIGLAS

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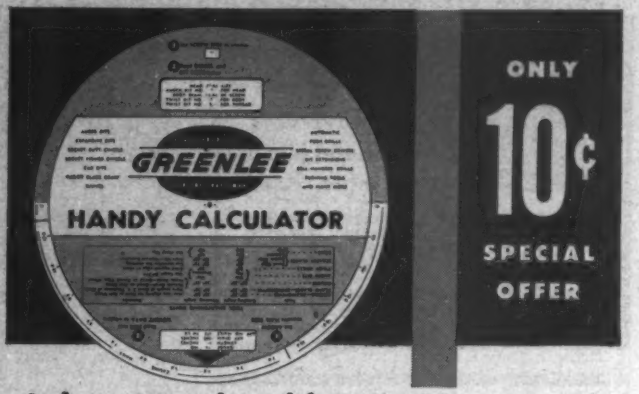

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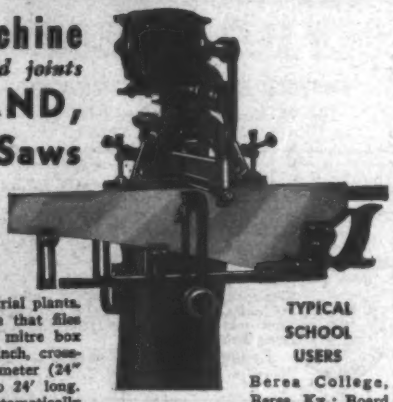

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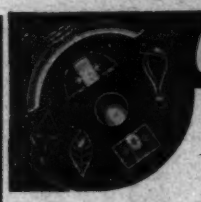

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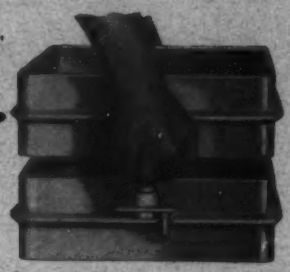

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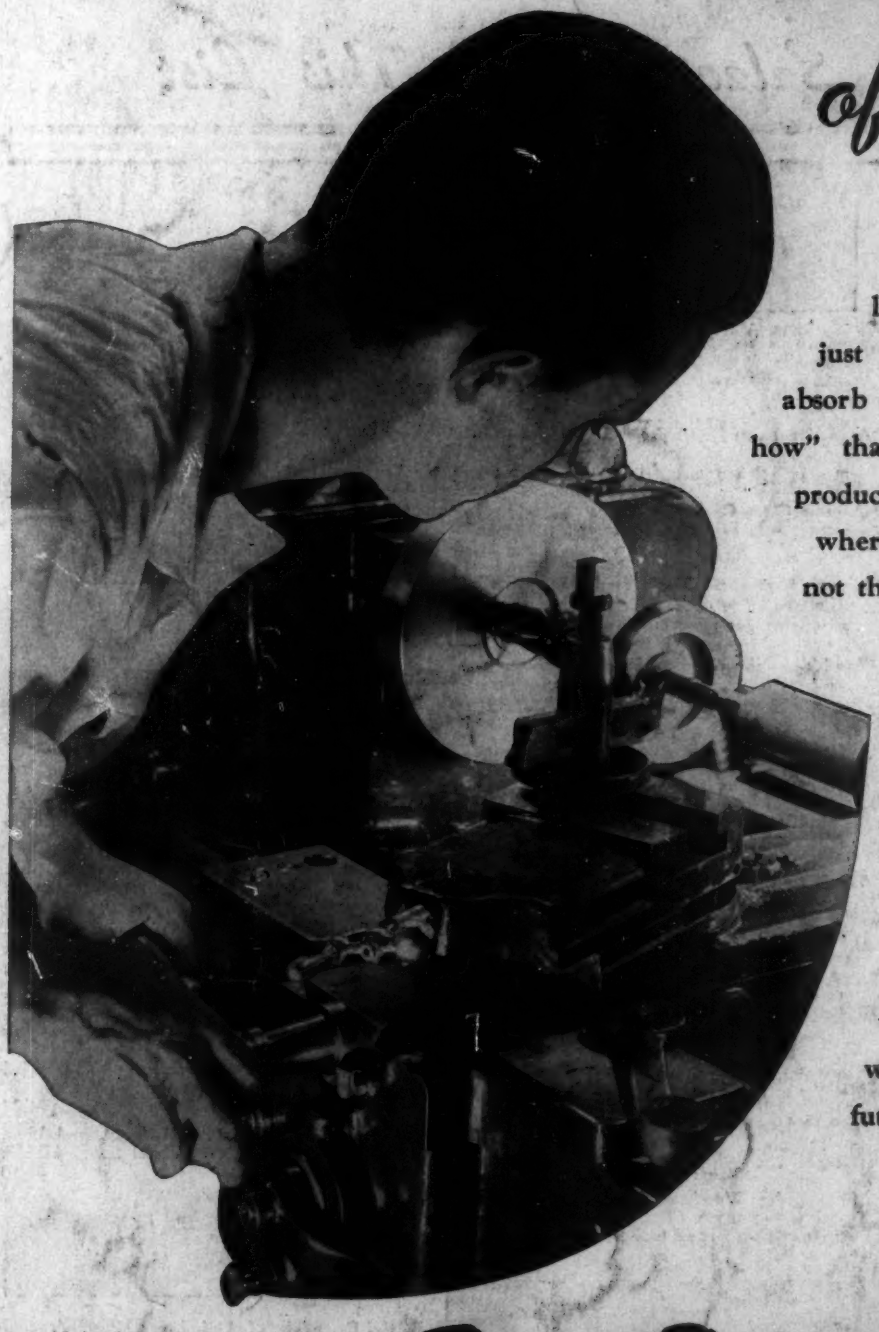

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